

CHESAPEAKE

BAY JOURNAL

July/August 2022

Volume 32 Number 5

Independent environmental news for the Chesapeake region

Decline in crab population sparks hunt for answers

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ABOUT THOSE CHICKENS



Incomplete data leaves Bay cleanup status unclear **PAGE 18**

OYSTER CASTLES IN ACTION



Constructed oyster reefs might help reduce erosion **PAGE 24**

NUTRIAS IN VIRGINIA

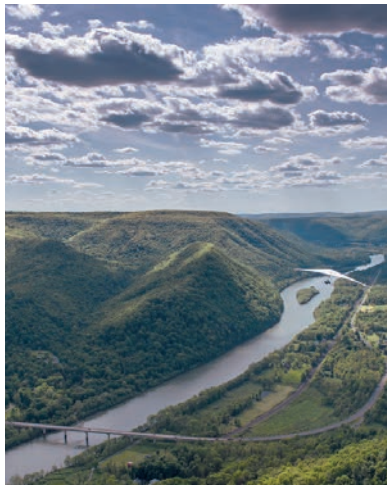


Invasive rodents are munching on marshland **PAGE 11**

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Efforts to develop a greenway along the Susquehanna River in Pennsylvania have conserved land, created more opportunities for outdoor recreation and supported local economies. Read the article on page 25. (Scott Hafer)

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EDITOR'S NOTE

Counting chickens, conserving crabs, conversing with readers

Sound science takes time, money and expertise. This month's *Bay Journal* provides at least three articles that demonstrate it.

Facing a worrisome decline in the population of blue crabs, fisheries managers have cut back on harvest limits. At the same time, scientists are grappling with possible causes and future management decisions. *Bay Journal* reporters Tim Wheeler and Jeremy Cox walk us through it with their article on page 14.

Regionwide, concerns are growing about key agricultural data used to estimate progress in the Bay's restoration. It's a complex, foundational problem: Oversights and variations in data can deliver very different numbers about how much the region has reduced nutrient pollution in the Bay and how much remains to be done. Scientists, agriculture experts and policymakers have not yet resolved the problem. Challenges lie in methodology and, to a great extent, funding. Karl Blankenship details the conundrum on page 18.

And plastics, plastics everywhere. Tiny bits, called microplastics, permeate our air and water. Yet surprisingly little is known about the extent of their presence in the Bay, its rivers and marine life, or how that could impact people who eat its seafood. Researchers at Morgan State University are delving into those questions thanks in part to a new federal grant and a lab on the Patuxent River. Read the article by Whitney Pipkin on page 22.

At the *Bay Journal*, we aim to provide our readers with insight on these and other complicated problems facing the region's ecosystem, as well as the people and processes working hard to solve them. Please let us know how we're doing. Watch your mailboxes for the arrival of our reader survey in late summer. I really hope you'll take a few minutes to respond, so that we can learn what you like about the *Bay Journal* and what you'd like us to improve. Your input matters!

— Lara Lutz



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ON THE COVER

Cristian Ramirez Guerrero dumps a bushel of female crabs into a steamer bin at G. W. Hall Seafood on Hoopers Island, MD. (Dave Harp)

Bottom photos: Left by Ad Crable, center by Dave Harp and right courtesy of the U.S. Department of Agriculture.

BY THE numbers

18%

Increase in the Chesapeake Bay watershed's human population between 1990–2007

70%

Portion of the Chesapeake Bay watershed's human population living in Maryland and Virginia

705

Square miles of Delaware located in the Chesapeake Bay watershed, the least of any state

0

Number of unprovoked shark attacks on record in the Chesapeake Bay

40,000

The number of teeth an average shark will go through in its lifetime

Bay anchovy

The fish you've probably never heard of



The bay anchovy, *Anchoa mitchilli*, may be the most important fish in the Chesapeake Bay that many people have never heard of.

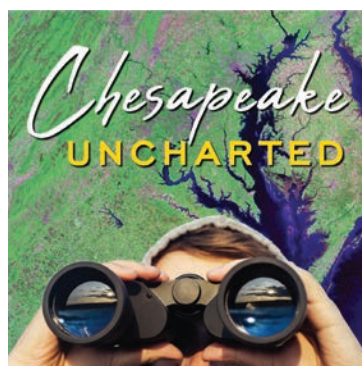
The small translucent schooling fish are typically less than 4 inches long but they play a mighty role in the food web, where they consume plankton and, in turn, become food for other fish and birds. They are the most important "forage" fish in the Bay.

They are also the most abundant fish in the Bay, with about 50 billion juveniles being produced annually, though year-to-year production can vary widely.

About bay anchovy

- They are found in coastal areas from Maine to the Gulf of Mexico.
- They occur throughout the Chesapeake and are widely tolerant of salinity and temperature.
- Females in the Chesapeake primarily spawn in late spring and summer. They can spawn every one to four days, typically producing more than 1,000 eggs per batch. Eggs usually hatch within a day.
- They are an important food for a variety of fish, including striped bass, summer flounder, bluefish and weakfish.
- They are eaten by many bird species, including terns, gulls, herons and egrets.
- In the larval stage, they are particularly susceptible to low dissolved-oxygen levels.
- They are less abundant in nearshore areas with hardened shorelines.
- They can live up to three years, but most individuals survive less than one.

Photo: Robert Aguilar/Smithsonian Environmental Research Center



bayjournal.com/podcast

LOOKING BACK

30 years ago

Pact created to protect the Nanticoke River

Maryland, Delaware, the federal government and nonprofit environmental groups signed an agreement to help preserve and protect the Nanticoke River. ■

— *Bay Journal*, July–August 1992

20 years ago

West Virginia joins Chesapeake Bay cleanup effort

West Virginia became the sixth and final state in the watershed to sign an agreement pledging to help clean up the Bay. ■

— *Bay Journal*, July–August 2002

10 years ago

April showers never showed up

The U.S. Geological Survey found that April flows to the Bay reached about 40% of the average flow for that month, the lowest on record during 76 years of monitoring. ■

— *Bay Journal*, July–August 2012

ABOUT US

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

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Karl Blankenship of the Bay Journal (right) takes notes while reporting on the presence of eels in the Susquehanna River watershed. (Dave Harp)

Celebrating recognition from researchers and a new radio partnership

Karl Blankenship, who began working as the *Bay Journal's* founding editor in 1991 and currently serves as editor-at-large, received the 2022 Sellner Chesapeake Bay Guardian Award at the Chesapeake Community Research Symposium in June.

The award is presented every two years to people who have made “significant and selfless contributions to the research, management and policymaker communities in the Chesapeake Bay and/or its watershed.” Karl was selected for his work at the *Bay Journal*, “translating latest scientific findings into interesting, readily understood articles for the general public.”

The award is named for Kevin Sellner, a retired Bay scientist and former executive director of the Chesapeake Research Consortium. Recipients of the award are selected by the Chesapeake Community Modeling Program.

Also recognized at the June symposium was the 2020 recipient of the award, Marji Friedrichs, who is a computer modeler at the Virginia Institute of Marine Science and a member of the *Bay Journal's* Science Advisory Committee.

To help more people learn about the great work by Karl and the rest of the *Bay Journal* team, we're excited to begin a partnership with Delmarva Public Media, which provides content for public radio stations on the Bay's Eastern Shore. We'll be working with them to air more episodes of our podcast, *Chesapeake Uncharted*, and to produce regular, on-air interviews with *Bay Journal* reporters about environmental news. Listen for us on WSCL 89.5, WSDL 90.7 and WESM 91.3.

Last month, 233 people registered for our free online event, *Chesapeake Dolphins*. Staff writer Whitney Pipkin hosted the one-hour webinar with a panel of scientists who are studying the presence of dolphins in the Bay to learn more about their health and behavior. If you missed it, good news: You can watch it online on the Chesapeake Bay Journal YouTube channel. Be sure to check out our other films and videos offered there, too!

If you have ideas for topics you'd like to see featured as part of a *Bay Journal* reader event, let us know by sending an email to news@bayjournal.com.

— Lara Lutz

Bay's 'dead zone' expected to have below-average year

Researchers from the Chesapeake Bay Program, University of Maryland Center for Environmental Science, University of Michigan and U.S. Geological Survey have predicted that the Bay's summertime "dead zone" will be about 13% smaller in 2022 than the average size of the dead zone recorded between 1985 and 2021.

According to the state-federal Chesapeake Bay Program, which leads the restoration effort, this is due to less water entering the Bay from its rivers this spring, as well as a decrease in nutrient pollution from some areas of the Bay's six-state watershed.

The Bay's dead zone is a deepwater area with low levels of dissolved oxygen that are hostile to marine life, including fish, blue crabs and oysters. The dead zone is mostly caused by nutrient pollution from human wastewater, animal manure and fertilizer.

The amount of pollution reaching the Bay each year varies and is based on the amount of rainfall, which flushes nutrients and sediment into rivers that flow into the Bay. The load is also impacted by the number and effectiveness of conservation practices that reduce and manage those pollutants.

The 2021 dead zone was approximately 14% lower than the long-term average.

An assessment of the 2022 dead zone will be available this fall. — L. Lutz

More than \$1 million awarded for green infrastructure

The Chesapeake Bay Trust, in partnership with the U.S. Environmental Protection Agency and West Virginia Department of Environmental Protection, announced in June that \$1,058,720 has been awarded to support 13 "green infrastructure" projects in the Chesapeake Bay region.

The money will help communities in Maryland, Pennsylvania, Virginia and West Virginia reduce polluted stormwater runoff, increase green spaces in urban areas, reduce energy use and improve water quality in streams and rivers that flow toward the Bay. The projects also aim to create jobs and support environmental conditions that protect human health.

The funds derive from the Green Streets, Green Jobs, Green Towns Initiative, which was started by the EPA in 2011 and expanded into a partnership program. To date, 245 projects have received

funding and \$14.4 million has been invested into greening communities.

"Green infrastructure projects are one of those rare win-win-win scenarios: They improve communities in various ways, they improve human health and they also benefit our waterways," said Jana Davis, president of the Chesapeake Bay Trust. "This program lets us take advantage of projects that communities want to do for themselves that just also happen to benefit the larger natural system way downstream."

One of the projects, in Chambersburg, PA, uses \$150,000 to help reduce stormwater runoff flowing into Conococheague Creek and associated flooding, as well as stabilize stream banks. Habitat in the stream corridor will be improved with pollinator gardens, vegetated streamside buffers and the removal of invasive species.

In Romney, WV, a grant of \$118,555 will filter stormwater by retrofitting a large parking lot and adjoining streets with bioswales. The goal is to reduce the impacts of runoff on a stream that flows into the South Branch of the Potomac River.

The Druid Heights Community Development Corp. will use a \$29,998 grant to reduce the amount of stormwater runoff going into the Jones Falls

in Baltimore. A community-envisioned greening plan will incorporate trees, bioswales and other stormwater management facilities.

In Petersburg, VA, the James River Association received \$118,146 to manage stormwater and improve water quality in the Lakemont community through the Nash Street grassy swale project.

Other projects will take place in York and Lancaster counties in Pennsylvania and in the Maryland communities of Columbia, Emmitsburg, Galena, Glen Echo, Millington, Mount Rainier and Preston.

— L. Lutz

Anglers aim to rein in harvest of Bay menhaden

A coalition of groups representing recreational anglers and boaters has launched a campaign against certain types of commercial menhaden fishing in Virginia.

Together, 11 national and 10 Virginia-based groups sent a letter in mid-June to Gov. Glenn Youngkin asking him to move menhaden "reduction fishing" out of the Chesapeake Bay. Reduction fishing refers to commercial harvests of the oily baitfish to grind

See **BRIEFS**, page 6

2021 Winner of Chesapeake Bay Foundation's "Clean the Bay Your Way Contest."



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From page 5

or “reduce” them into meal for use in pet food, vitamins and other products.

The groups, which include the Theodore Roosevelt Conservation Partnership, the Marine Retailers Association of the Americas and state and national sportfishing associations, are concerned that annual harvests of menhaden have “deprived gamefish like striped bass, bluefish and weakfish of a critical food source.”

The striped bass fishery is the largest marine recreational fishery in the country, the groups said, driving \$166 million in recreational fishing activity in Virginia alone. But the economic value of striped bass fishing to the state has declined by more than 50% in the past decade, they said.

Striped bass stocks have been struggling for more than a decade, with anglers in the Bay recently facing an 18% reduction in striped bass harvest allowances.

Conservation and angler groups have long blamed the reduction fishery, based in Reedville, VA, for contributing to the striped bass decline. The fishery, operated by Canada-based Omega Protein, harvests about three-quarters of all the menhaden caught along the East Coast. Measured by weight, menhaden are by far the largest harvest taken from the Bay.

But the impact of their harvest on striped bass in the Chesapeake is unclear. While menhaden constitute a sizeable portion of the diet of larger adult striped bass in coastal waters, studies show they are less important to those in the Bay where much of the striped bass population consists of juvenile fish that tend to eat smaller food species like bay anchovy.

Some scientists agree that menhaden should be managed in a precautionary manner while more studies are conducted on the overall ecological impact of annual harvests. The Atlantic States Marine Fisheries Commission, which regulates regional menhaden harvests, agreed in 2020 to cut the allowable commercial harvest of Atlantic menhaden 10% from what it has been the last three years. Additional changes could be in store this fall.

— W. Pipkin

Pequea Creek restoration work moves ahead in PA

The U.S. Environmental Protection Agency has approved a plan to restore southeastern Pennsylvania’s Pequea Creek watershed.

The approval of the restoration plan means \$2.2 million secured in 2021 by U.S. Sens. Bob Casey of Pennsylvania and Ben Cardin of Maryland can be used to begin the project. Financial aid to develop the plan came from the Richard King Mellon Foundation.

The 153-square-mile watershed is a heavily

farmed area in Lancaster County, which sends more sediment and nutrient pollution into the Chesapeake Bay than any other county in the state, according to the Chesapeake Bay Foundation, which developed the restoration plan. Much of that pollution derives from agriculture.

To stem the flow of pollutants, a host of conservation practices will be used on farms, including cover crops, no-till agriculture, nutrient and animal-waste controls, streamside buffers, streambank fencing, streambank stabilization and the removal of “legacy” sediment left from old mill dams.

Plain sects own a majority of the farms in the watershed. Church leaders helped tailor the plan.

“This will require decades of efforts, but with continued community support and funding, the Pequea will one day reach its vibrant potential,” said Brian Gish, the Chesapeake Bay Foundation’s watershed coordinator for southcentral Pennsylvania.

— A. Crable

Bay earns another C grade in latest report card

The Chesapeake Bay’s condition ticked upward in 2021 but not enough to raise its middling C grade in the latest report card from the University of Maryland Center for Environmental Science.

The Bay’s overall ecological health garnered a 50% score, up 5 points from 2020, as some things got better and others worse. The nutrient pollution

that causes summertime dead zones in the Bay improved, but the water got murkier and contained more algae.

The Bay’s condition varied from one end of the estuary to another and even by tributary. As it has for years, the Lower Bay in Virginia had the best health relative to the rest of the Bay. The Patapsco and Back rivers around Baltimore continued their decades-long run as the sickest rivers, joined by Maryland’s Patuxent River.

Ecological scores vary from year to year in the annual UMCES report cards, largely because of shifting weather patterns. Still, UMCES concludes that the Bay’s general condition over time has improved slightly — gaining just 2 points in a 100-point scale — since the mid-1980s.

Around the Bay, the James and Elizabeth rivers in Virginia have shown significant long-term improvement, UMCES said. So have the Bush and Gunpowder rivers in Maryland. Even the Patapsco and Back rivers have less nutrient pollution than they did 45 years ago.

But one area, the Upper Eastern Shore of Maryland, is trending in the wrong direction. The chief culprit is presumed to be nutrients from farm fertilizer running off the land or seeping through groundwater into rivers and streams.

UMCES has expanded its report card in the Bay’s 64,000-square-mile watershed. The region earned a C+, indicating moderate health in 2021, a notch below the B-minus bestowed in 2020.



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But the two regional grades aren't comparable, UMCES noted. Along with the usual ecological indicators, the 2020 report card included societal factors such as the walkability of communities and their vulnerability to extreme heat. The 2021 version added four more indicators: household income, job growth, income inequality and housing affordability.

The economic data, broken down by region and county, is available at chesapeakebayreportcard.org. — T. Wheeler

MD oyster regs remains unchanged this season

On the heels of a 35-year high in Maryland's wild oyster harvest, the state Department of Natural Resources has announced catch regulations will remain unchanged when the 2022-23 season begins Oct. 1.

About 1,200 watermen landed 542,000 bushels of bivalves last season, the biggest haul since the 1986-87 season, according to DNR. It was worth about \$21 million dockside.

That was a remarkable rebound for the wild oyster fishery. Just three years earlier, record rains flushed so much freshwater into the Chesapeake Bay that it was hard for oysters to reproduce or grow. Their harvest was about one-fourth as large, and the state for a couple of years reduced

harvesting from five days a week to four.

Now, with surveys finding above-average crops of juvenile oysters on Bay and river bottoms, some harvesters wanted to see the daily bushel limits increased a little. Others urged the state to keep the same rules as last season. — T. Wheeler

Plan proposed to deal with abandoned boats in VA

A Virginia agency now has a plan to tackle the growing problem of abandoned boats that pollute and impede the use of waterways in the state.

The plan, released in a report in early July, estimates that about 200 abandoned and derelict vessels need to be removed from the water and suggests that a new program and more funding could help prevent boat abandonments.

The Virginia Coastal Zone Management Program and Clean Virginia Waterways of Longwood University suggest in the plan that the state General Assembly allocate \$3 million from general funds in 2023 to begin removing up to 100 "high-priority" abandoned vessels per year.

By the program's third year, the report envisions "a streamlined program with sustainable funding" will continue to keep abandoned vessels from wasting away in local waters.

"Having unclaimed vessels in waterways creates navigation difficulties, environmental risks and economic impacts, which puts humans and marine species alike at risk," said Katie Register, Clean

Virginia Waterways' executive director and co-author of the report. Disposing of boats by sinking or leaving them in waterways is already illegal. But boat owners in the state have few affordable options for proper disposal. Stakeholders suggested creating a state-funded program to make it easier to dispose of older boats and to potentially develop recycling options for them.

Unlike old cars, whose mostly metal frames can be sold or donated for scrap materials, the fiberglass components of a boat tend to cost more to dispose of than they are worth, reports have found. — W. Pipkin

No-discharge zone in place for 13 MD waterways

A federally approved no-discharge zone took effect July 1 for 13 bodies of water in Anne Arundel County, MD, prohibiting the openwater discharge of all boat sewage. The state Department of Natural Resources and Department of the Environment applied to the U.S. Environmental Protection Agency for the no-discharge zone after a request from Anne Arundel County, the City of Annapolis and the Severn River Association.

"Finally winning this designation for our county's rivers is a major victory," said Anne Arundel County Executive Stuart Pittman.

According to DNR, the impacted waterways have a high concentration of boats, natural resources sensitive to boat sewage, a prevalence of water

contact activities, and problems with nutrient and sediment pollution. The areas under the no-discharge zone include the Atlantic Marina Resort, Bodkin Creek, Fishing Creek, Magothy and Little Magothy rivers, Oyster Cove, Podickory Creek, Rock Creek, Sandy Point/Mezick Ponds, Severn River, South River, Stoney Creek, West and Rhode rivers and Whitehall Bay.

The application process confirmed that there are adequate pumpout facilities within those areas for commercial and recreational vessels. — L. Lutz

VA governor selects new marine resources chief

Virginia Gov. Glenn Youngkin has appointed a longtime marine law enforcement official to head the state's Marine Resources Commission.

Jamie Green succeeds Justin Worrell, who was appointed acting commissioner by Youngkin during the Republican governor's first days in office in January.

The commission manages saltwater fisheries and habitat for both commercial and recreational species, including blue crabs, oysters and menhaden.

Green joined the commission in 2005 as a law enforcement officer and rose through the ranks to lieutenant colonel, according to the agency's website. He is a native of Gloucester County and grew up in a family of watermen, according to a Facebook page created for his unsuccessful 2017 bid to become commissioner. — J. Cox

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As 2025 approaches, Bay cleanup goal grows more elusive

At 2021 rate, it would take four decades to reach cleanup goal

By Karl Blankenship

The Chesapeake Bay region reduced the estimated annual amount of nitrogen pollution reaching the Bay by about 1 million pounds in 2021, according to computer model estimates released June 29.

That leaves the region with 41 million pounds of nitrogen reductions left to achieve its 2025 cleanup goal. But if progress continues at the 2021 rate, it will take Bay states another 40 years to reach that goal.

The figures, part of the annual update from the state-federal Chesapeake Bay Program partnership, is the latest indication that the region is unlikely to meet its nutrient reduction goal on time — or anytime in the near future.

Overall, the computer model estimates show that since the new Bay cleanup plan

was established in 2010, the region has achieved about 42% of its nitrogen reduction goal, leaving just four years to do the rest.

An overload of the nutrients nitrogen and phosphorus are the main cause of poor water quality in the Bay.

The progress report is better for phosphorus, with the region achieving 64% of its goal to date.

But nitrogen is the most problematic nutrient to control and plays a larger role in fouling the Bay. And the region also faces even greater headwinds in meeting its nitrogen goals than the new figures indicate.

The 2021 figures show that since 2009, the District of Columbia and West Virginia have achieved their nutrient reduction goals. Among other states:

- Maryland has achieved 58% of its nitrogen goal.
- Virginia has achieved 75% of its nitrogen goal.
- Pennsylvania has achieved 22% of its nitrogen goal.
- Delaware has achieved 20% of its nitrogen goal.

- New York has achieved 69% of its nitrogen goal.

According to the model, most nutrient reductions in the watershed last year came from agriculture, with pollution from wastewater treatment plants and runoff from developed lands edging up a bit.

Baywide, the figures show that since 2009, the amount of nitrogen reaching the Bay annually has been reduced from 270.8 million pounds to 240.5 million pounds. The 2025 goal is to have implemented all of the actions needed to reduce nitrogen to 199.3 million pounds. It could take several years for various runoff control actions to become fully effective, though.

But even if the region were to succeed in meeting those 2025 goals, it won't be enough to reduce nitrogen in the Bay to acceptable levels. That's because additional loads of the nutrient are now reaching the Bay due to climate change and problems behind the Conowingo Dam.

Bay Program partners are trying to tackle those challenges. They have committed to cutting another 6 million pounds of the

annual nitrogen load to offset the filling of the Conowingo Dam reservoir on the Susquehanna River, which has resulted in more nutrients going downstream. And they aim to reduce another 5 million pounds to offset the water quality impacts of climate change.

There are also concerns about data accuracy in the Bay Program computer model. A newer version of the model, which includes updated agricultural data, indicates that another 5 million to 6 million pounds of nitrogen reduction would be needed to offset the intensification of farming operations in recent years. That model version was not used for the 2021 update, though, as states have questioned its accuracy.

Most reductions since 2009 — the baseline year for measuring progress — have come from upgrading wastewater treatment plants. But nearly all of those plants have been upgraded, so most of the remaining reductions need to come from agricultural lands, which are also the largest source of nutrients reaching the Bay. ■

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EPA names Kandis Boyd new director of Bay Program Office

Former federal scientist took helm in June

By Timothy B. Wheeler

Kandis Boyd, a former federal scientist and agency senior manager who most recently advised the National Science Foundation on diversity, equity and inclusion, has been hired to direct the U.S. Environmental Protection Agency's Chesapeake Bay Program Office, the agency announced on June 2.

Boyd assumed leadership of the office on June 6. Its staff in Annapolis helps coordinate the efforts of federal agencies, the six Bay states and the District of Columbia to restore the estuary's water quality.

"I'm extremely humbled and excited to work with a forward-focused team of specialists and experts to advance the ongoing work of EPA and the Chesapeake Bay partners," Boyd said. "I'm ready to dive in and get to work on the most pressing matters before us."

Boyd takes over as the region is struggling to reach a variety of water quality goals with a 2025 deadline, including reducing nutrient pollution in the Bay.

"I'm thrilled to have Kandis join our leadership team as we are stepping up restoration efforts for the Bay in the face of emerging challenges," said Adam Ortiz, the EPA's Mid-Atlantic regional director. "Her experience as a strategic leader in the sciences and success engaging diverse communities and youth will help take the Bay effort to a new level as we focus on climate change and vulnerable communities."

Boyd previously served as an adviser for the Office of Equity and Civil Rights at the National Science Foundation. Before that, she was deputy director of the foundation's Division of Grants and Agreements, helping to manage a \$5 billion budget and more than 12,000 new grants annually.

She began her career in 1996 with the National Weather Service after becoming the first African American woman to receive an undergraduate degree in meteorology from Iowa State University. In more

than 20 years with the National Oceanic and Atmospheric Administration, she provided advice on NOAA's \$2 billion satellite portfolio and rose to become deputy director and acting director of its weather program office.

Boyd has a Ph.D. in public administration from Nova Southeastern University in Florida and master's degrees in meteorology, water resources engineering and project management from Iowa State and George Washington universities, according to her LinkedIn page.

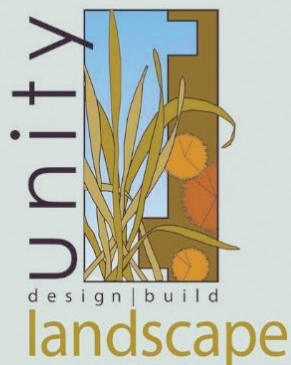
Environmental advocates welcomed Boyd and said they look forward to working with her.

Kristin Reilly, director of the Choose Clean Water Coalition, said Boyd "has an established record of leadership with an unquestioned commitment to science."

Hilary Falk, president of the Chesapeake Bay Foundation, cited Boyd's leadership skills and said she has "the knowledge to ensure we are guided by the best science and the personal commitment to ensure that vulnerable communities are not left behind." ■



The U.S. Environmental Protection Agency has selected Kandis Boyd to lead its Chesapeake Bay Program Office. (Courtesy of the U.S. EPA)

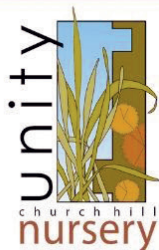


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Suit seeks to halt large development on MD's Eastern Shore

First group of homes will hook up to outdated sewage plant

By Timothy B. Wheeler

The dispute over a proposed massive development on Maryland's Eastern Shore is back in court.

Eleven Talbot County residents and a nonprofit group formed by one of them have sued the Maryland Department of the Environment. They accuse the agency of violating state law by letting construction proceed at the Lakeside development in Trappe after the county planning commission withdrew its approval.

The residents and Talbot Integrity Project contend that MDE should have revoked a permit that allows the first 120 homes at Lakeside to pipe their wastewater to the town's outdated sewage treatment plant after the county planning commission rescinded its prior endorsement. The

plaintiffs have asked the court to order MDE to effectively halt construction by revoking its permit.

The lawsuit contends that, under state law, MDE can only approve sewer infrastructure changes for new development if the local planning commission declares they are in line with the county's long-range growth plan. The plaintiffs argue that MDE is breaking the law by ignoring the Talbot planning commission's decision to revoke its support for Lakeside.

"All we want is for MDE to do the right thing [and] not add pollution to La Trappe Creek, which is already impaired, and to abide by and enforce the law," said Dan Watson, the lead plaintiff.

The lawsuit, filed May 27 in Talbot County Circuit Court, is the latest skirmish in a long-running controversy over the planned residential and commercial project, which if completed could easily quintuple Trappe's population of about 1,000 residents.

The developer wants to build 2,501 housing units and a small shopping center



Masonry workers build an entrance at the Lakeside development in Trappe, MD. (Dave Harp)

on 860 acres of farmland that Trappe annexed in 2003. But environmentalists and neighboring residents have objected to wastewater treatment plans for the development, worried that it could add to pollution already fouling the Choptank River.

The project already has had one round in court after MDE in 2020 approved the developer's proposal to build a sewage treatment plant for the new homes and businesses and to spray up to 540,000 gallons of treated wastewater daily on meadows nearby. That site borders the headwaters of Miles Creek, a Choptank tributary that, like the river, is impaired by nutrient and sediment pollution.

Opponents, worried that nutrients in the wastewater could run off or leach into the creek, or that the spray could drift to neighboring homes, sued MDE over that plan. A Talbot Circuit Court judge ruled in their favor, finding that because the developer had altered the original wastewater plans, the public deserved another chance to comment on them.

State regulators then held a packed public hearing last October on the proposed permit, at which dozens of residents voiced their concerns. The Chesapeake Bay Foundation also presented a report challenging MDE's findings that the orchard grass meadow would soak up all of the nutrients in the sprayed wastewater.

Opponents of the development raised new concerns in the fall when they realized that MDE had allowed the developer to pipe sewage from the first 120 homes to the town's existing treatment plant, which

discharges into La Trappe Creek, another Choptank tributary.

Critics pointed out that the town plant is old, has relatively lax treatment requirements and had pollution violations earlier in 2021. Water sampling by ShoreRivers in the summer of 2021 found algae blooms, elevated nitrogen and *E. coli* bacteria, an indicator of animal or human waste, in the creek downstream of the plant.

After receiving that information, the county's five-member planning commission voted 3-2 last November to rescind its 2020 endorsement of the project.

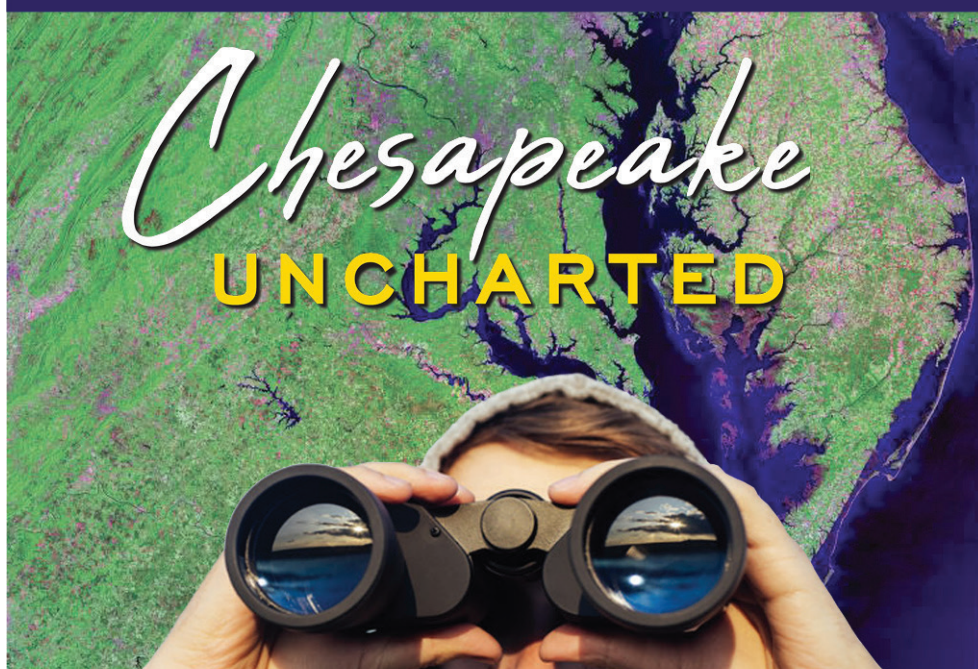
But the county council refused to go along with the commission and, in March 2021, narrowly rejected a resolution that would have altered its previous support of the development.

Watson said his opposition to the Lakeside development is "not a NIMBY thing." He lives about 15 miles from Trappe on a different Bay tributary. Although he supports ShoreRivers and is concerned about water quality, he said he joined the opposition because he was "offended" by what he saw as "improprieties" in the development approval process.

"There's nothing wrong with development, nothing wrong with making profits on projects," he said. "But at the very least, people need to do it right."

MDE spokesman Jay Apperson said the agency is still reviewing its final decision on the Lakeside developer's application for a permit to spray the new community's wastewater on adjoining grassy fields. ■

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'We know they're here' — on the hunt for invasive nutrias in VA

Goal is to eradicate rodent before it can eat its way through marshes

By Jeremy Cox

For the foreseeable future, Mary Krieger and Jacob Berman's main objective as U.S. Department of Agriculture wildlife specialists is to scour the cypress swamps of tidewater Virginia for rodents of unusual size.

Specifically: nutrias. If left to their own devices, the South American invasives can chew their way through acres of marsh grass, destroying vital nursery and spawning grounds for fish and weakening an important line of defense against rising seas.

On a recent patrol in a jonboat on the Chickahominy River, Krieger and Berman checked for signs of nutrias left behind on wooden platforms the size of pizza boxes. When the semi-aquatic animals haul themselves out of the water, small snares capture clumps of hair for later identification.

Or so the theory goes. On this overcast morning, the evidence consistently pointed to a different species frequenting the platforms.

"Raccoon!" Berman called out as he hunched over the side of the boat, squinting at the telltale sprigs of gray fur. "I think we're five-for-five so far."

If there are no nutrias to be found, isn't that a good thing? "It's good and bad," Krieger said, "because we know they're here. It's just a matter of finding them."

Alarm bells sounded throughout state and federal wildlife agencies in January 2020 when a nutria was discovered just south of Providence Forge, dead after being struck by a vehicle. What was so troubling was that nutrias had never been detected north of the James River in Virginia.

"That is concerning because we're now worried about them moving up the Northern Neck area all the way up toward Maryland," said Michael Fies, a wildlife biologist with the state Department of Wildlife Resources.

To the untrained eye, a nutria (*Myocastor coypus*) can be mistaken for a muskrat or beaver, both Virginia natives. But they can be distinguished by their long, white whiskers and orange front teeth that resemble two baby carrots.



Jacob Berman and Mary Krieger, wildlife specialists with the U.S. Department of Agriculture, check a wooden platform for signs of nutrias on Virginia's Chickahominy River. (Jeremy Cox)

They were imported to the United States in the early 1900s to establish a new source of fur for the fashion industry. When the animals literally fell out of fashion, many of their caretakers simply set them free. That's thought to have been the source of Virginia's main population of nutrias, found

in and near Back Bay National Wildlife Refuge south of Virginia Beach.

Nutrias have been living in the refuge since the 1950s, but they have never managed to make their way northward, said Scott Kopfler, a Virginia Tech wildlife biologist. It's likely that the James River

served as a barrier. But even if they had made a successful crossing of the wider part of the river, the colder weather would have wiped out the equatorial transplants.

But climate change is leading to fewer cold snaps, making inland portions of Virginia more hospitable to nutrias. The population north of the James probably migrated from North Carolina and crossed the James farther upstream where it is narrower, Kopfler said.

The voracious eaters have found plenty of sustenance. Kopfler's research shows that the areas where they are already considered "endemic" contain more than 46,000 acres of their favorite food: freshwater and tidal wetlands.

"They'll actually feed on the root and kill the plant instead of grazing on the top, which allows the plants to grow back," he said. The result is large swaths of marshland reduced to mud flats.

Because nutrias have no known natural predators in the Chesapeake Bay region, humans have needed to step in. The model for that work already exists — right across the Bay. A USDA-led eradication project launched in 2002 at the Blackwater National Wildlife Refuge in Maryland's southern Dorchester County removed about 14,000 nutrias from the marshy landscape. The last known capture was in 2016.

Success didn't come cheap. Overall, it cost about \$25 million, or about \$1,800 per nutria removed.

"That was no small endeavor to literally catch every single one," Fies said.

The Maryland nutria program's final surveillance work is winding down this year, along with its \$1.5 million in annual federal financing. Fies said his agency is pushing the state's congressional delegation to continue and transfer that funding to Virginia's mainland.

Before the Virginia eradication can begin in earnest, biologists must determine the nutrias' current range. In the wake of the roadkill discovery, wildlife officials have recorded 10 detections along a 10-mile stretch downstream on the Chickahominy River. The survey area includes most of the Chickahominy system within New Kent, Charles City and James City counties.

The effort extends beyond humans on boats. Since its inception, the program has trained six nutria-detecting dogs. The most recent one, a Labrador retriever named Bradie, completed her training in May. ■



Nutrias cause significant damage to coastal areas in the United States because they eat the roots of marsh plants. (U.S. Department of Agriculture)

Water treatment plant powers up for cleaner energy

In DC, Blue Plains innovates to offset energy consumption

By Whitney Pipkin

Clean water and clean energy sound like they should work in tandem. But at the Blue Plains Advanced Wastewater Treatment Plant — the largest facility of its kind in the world, located on the banks of the Potomac River — it's not always that simple.

Wastewater treatment requires a lot of energy. Some smaller facilities have been able to generate all of their electricity onsite or acquire it from carbon-neutral sources. But the greater level of treatment required by wastewater plants in the Chesapeake Bay watershed requires more power, making it harder to reach sustainability goals.

Blue Plains covers 175 acres at the southern tip of the District of Columbia. Operated by DC Water, the plant removes pollutants from wastewater to meet some of the strictest federal limits in the country before discharging it to the Potomac River, which flows into the Bay.

Much of that process requires electricity, making Blue Plains by far the largest consumer of energy in the DC region.

Nitrogen removal, in particular, takes a lot of energy.

“Those bubbles are our largest electricity consumers,” said Ryu Suzuki, a process engineer for DC Water, as he passed vast, bubbling pools of water during a recent tour of the plant.

The aeration process helps “create the right biology for the microorganisms to do the work for us,” Suzuki said. “We give [them] plenty of air, and the food is what we flush down the toilet.”

But Blue Plains is working toward both cleaner water and cleaner energy.

Radhika Fox, assistant administrator for the U.S. Environmental Protection Agency's Office of Water, participated in the tour of the facility and said she wished she could “bottle” the progress made there, then spread those lessons to others.

Fox said one of her priorities for the \$50 billion in federal infrastructure funds flowing through her office is to help water utilities become “net-zero” in their carbon emissions. That involves generating their own energy or acquiring it from renewable sources.



The Blue Plains Advanced Wastewater Treatment Plant is very effective at removing nutrient pollution from wastewater, but it's an energy-intensive process. (Courtesy of DC Water)

A wastewater treatment plant in Oakland, CA, was among the first to achieve the net-zero goal and even brings in outside waste products to produce more biogas fuel than the facility needs, allowing them to sell the excess. But the plant doesn't have to clean its wastewater to the same degree as plants in the Chesapeake watershed.

Blue Plains purchases most of its power from the grid. But in 2015 it became the

first plant in North America to use thermal hydrolysis to meet about 30% of its energy needs. The process uses heat and pressure to “cook” the solids left behind after water treatment. That produces methane, which then runs the turbines that produce electricity. The remaining, sterilized solid product is sold as a compost-like material to local farmers and gardeners.

“It's incredibly energy efficient, and we are

making use of what was once a liability and now recover it as an asset,” said Chris Peot, director of resource recovery at DC Water.

In 2020, the utility began erecting solar panels over its parking lots and other locations as part of a 20-year purchase agreement with a solar provider. The arrangement should save DC Water \$4 million in operating costs over 20 years and make the facility more resilient in the face of a power grid outage.

A new headquarters located off the Anacostia River in the District's Navy Yard, which opened in 2019, uses heat recovered from sewage to provide energy to the building.

Suzuki said the low-hanging fruit of that effort is finding efficiencies, or ways to “do more with less.” With energy and chemical costs skyrocketing for the plant, there's no time like the present.

But the utility's research and development team is exploring more innovative solutions. During the tour, Haydee De Clippeleir, director of water quality and technology, explained some of their pilot projects. In one, they “starve” the microorganisms that consume nutrients by withholding fresh nutrients for a period of time and then reintroducing them, which speeds up and improves the pollution removal process. “Imagine you're starved for a week, and you go to a buffet,” she said.

The team also is working with a bacteria called anammox that, while finicky, can remove nitrogen without additional energy inputs. That could reduce methanol costs and aeration by 50%.

Many energy-saving strategies are fueled by a desire to reduce costs — a necessity for public utilities, which often pass new infrastructure expenses on to ratepayers.

That's a concern for Blue Plains, as it faces other costly regulatory requirements. DC Water, under a consent decree with the EPA, is partway through a \$2.7 billion project to curb polluted stormwater overflows into Chesapeake tributaries. That entails building miles of underground tunnels to store sewage-tainted stormwater until it can be treated at Blue Plains.

Matt Ries, director of strategic leadership and sustainability at DC Water, said the utility's energy initiatives are informed by “that push and pull of trying to continue to be good environmental stewards and protect resources for the District and the Bay — and [keeping] things affordable for ratepayers.” ■



Radhika Fox, center, assistant administrator for the U.S. Environmental Protection Agency's Office of Water, tours the Blue Plains wastewater plant to learn about its clean-energy initiatives. (Whitney Pipkin)

PA makes 'historic' commitment to clean water projects

New law creates state's first dedicated funding source to reduce pollution in waterways

By Ad Crable

The Pennsylvania legislature has approved using \$220 million in federal money to create a new Clean Streams Fund to reduce polluted runoff into the state's waterways, a move that could significantly help the state's lagging progress toward Chesapeake Bay cleanup goals.

In all, the General Assembly directed nearly \$700 million from the American Rescue Plan Act — the federal COVID relief funding — and some state oil and gas funds for environmental initiatives in its 2022–23 budget. It was approved July 7 and signed the next day by Gov. Tom Wolf.

Although the funding was approved in this year's budget, the state has three years to spend the money.

Bay advocates had heavily pushed for the Clean Streams Fund to help bolster Chesapeake pollution reduction efforts. The U.S. Environmental Protection Agency this spring faulted the state's latest cleanup plan for being inadequate and underfunded and, as a result, began ramping up water-related inspections.

The agency warned it would take further actions if the state failed to submit an improved plan this summer. It also said the state should establish a cost-share program to help farmers install conservation practices on their land — something Maryland and Virginia have, but Pennsylvania does not, even though it has the most farms of any state in the Bay watershed.

The new Clean Streams Fund will help fill that void, with 70% of its funding, or \$154 million, directed to county conservation districts to assist farmers.

Ann Swanson, executive director of the Chesapeake Bay Commission, which consists of lawmakers from across the region and whose members had pushed for the new funding, said the legislation represented a "historic" commitment for Bay restoration efforts on the part of Pennsylvania.

"It is exciting to see this significant commitment of funding to help farmers and communities achieve their own goals for clean water here in Pennsylvania," said Marel King, the commission's Pennsylvania director.

Republican lawmakers who pushed for the fund said it would help farmers afford critically needed on-farm improvements



Farms dominate the landscape in Narvon, PA, in eastern Lancaster County. (Dave Harp)

without the burden falling on state taxpayers or landowners.

Although the program will be statewide, allocations will be based on a county's concentration of livestock, crop acreage and miles of agriculturally impaired streams. That means some of the biggest contributors to nutrient and sediment pollution to the Bay, such as Lancaster County, would receive significant funding.

Other disbursements from the Clean Streams Fund will include:

- \$22 million for a new "pay-for-success" approach that would support private-sector projects to reduce nutrient pollution. The state could, for example, pay for private ventures such as largescale facilities that use manure to produce energy.
- \$22 million added to the existing Nutrient Management Fund to help farmers prepare conservation and nutrient-management plans required by the state.
- \$8.8 million to be shared with local governments to help them meet federal requirements to stem stormwater runoff in urban and suburban areas.
- \$8.8 million to pay for riparian buffers and TreeVitalize, a public-private program created by the state to encourage communities to plant more trees.
- \$4.4 million for the cleanup of abandoned mine drainage pollution.

Legislative leaders largely avoided touting the renewed funding as aid for the Bay restoration effort. Rather, they emphasized it would restore impaired waterways in the state to benefit tourism, agriculture and local economies.

Nearly one-third of Pennsylvania's river

and stream miles, or more than 25,000 miles, are classified as impaired. That means they are either not safe for drinking, swimming or fish consumption, or do not support aquatic life.

Pollution in approximately 70% of those waterways comes from agriculture runoff or acid mine drainage, according to the state Department of Environmental Protection.

Besides the new programs to control runoff, the legislation includes \$320 million in federal and state funding for other water and sewage projects in the state.

Also receiving \$100 million from the state's federal allotment is a popular statewide program formerly known as Growing Greener — renamed and expanded as the State Parks and Outdoor Recreation Program. The funds will help improve streams, complete long-backlogged infrastructure and trail improvements in state parks, create local parks, and preserve farmland.

"The importance of this funding cannot be overstated," PennFuture President Jacquelyn Bonomo said of the two funding initiatives. "It represents truly monumental victories for Pennsylvania's land, air, water and natural resources."

In another water-quality move by the state legislature, lawmakers passed a bill that will reduce fertilizer use on home lawns, golf courses, parks, athletic fields and other developed lands.

Similar legislation had been introduced without ever getting out of committee for the last 12 years.

The new controls, comparable to regulations that were passed in Maryland and Virginia in 2011, are designed to reduce

nutrient pollution that flows into local waterways and moves downstream to the Bay. An overload of the nutrients nitrogen and phosphorus cloud the water, cause harmful algae blooms, and trigger "dead zones" in the Bay.

Legislators added a stipulation to the fertilizer bill that if the EPA doesn't give the state credit for nutrient reductions as a result of the new regulations, they would be withdrawn at the end of 2026.

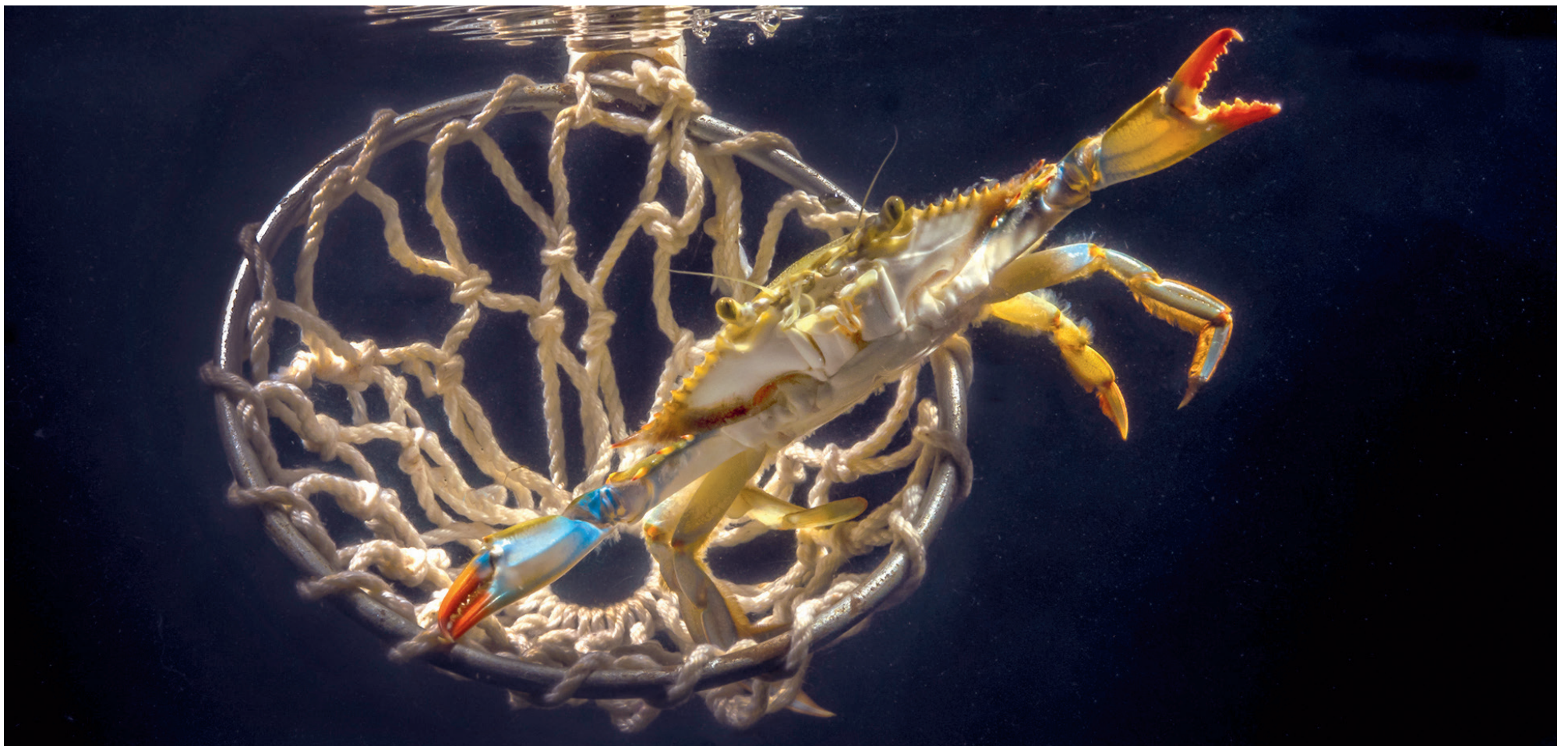
The regulations will ban phosphorus (except for lawn-repair purposes) and limit the amount of nitrogen that can be sold in bags. It also requires labels to guide users against over-fertilizing turf.

The measure also requires an education program to inform homeowners and farmers about the correct way to apply fertilizer and in amounts safe for the environment.

Those who apply fertilizers to public parks, golf courses, athletic fields and other turf areas must follow new standards that guard against fertilizer being applied too close to waterways or at too high a rate.

Before the vote, legislators removed a requirement that landscaping services and other professionals be trained and certified in fertilizer application. Environmental groups and the Chesapeake Bay Commission had pushed for its inclusion.

"We wouldn't have pursued a training and certification program for professionals if we didn't believe it would have provided additional benefit, but this is still a big step forward for Pennsylvania and our efforts to address loads from developed lands," King said. ■



Decline in Bay's crab population sparks hunt for answers

Sex imbalance, catfish predation are among suspects for lowest count in three decades

**By Timothy B. Wheeler
& Jeremy Cox**

It's been a lean season for crabbers and crab lovers alike, with the Chesapeake Bay's popular crustaceans at their lowest level in more than 30 years.

Commercial crabbers in Maryland and Virginia aren't catching their limits, and the harvest in the first few months of the season was so meager that some gave up trying.

"Crabs are so scarce that me and my son are still catfishing," Billy Rice, a Charles County, MD, waterman, said in June. "We're making more money catfishing than we would be crabbing."

Based on what they see on the water, crabbers have no shortage of theories about why the Bay's most prized catch is hard to find: Changes in water quality, climate change and an influx of crab-eating fish top the list.

Photo: A female blue crab scrambles to elude a dip net. (Dave Harp)

Whatever the case, said J. C. Hudgins, president of the Virginia Waterman's Association. "Mother Nature has thrown a wrench in the barrel."

Scientists aren't sure what's behind the slump, and many say it worries them because crabs are such an important part of the Bay region's seafood industry and food culture.

"It's rough surf," said Tom Miller, who's been studying the blue crab, *Callinectes sapidus*, for nearly three decades. He's director of the Chesapeake Biological Laboratory at Solomons, MD, part of the University of Maryland Center for Environmental Science.

The Chesapeake's crab population tends to yo-yo naturally every year or two. This year, though, marks the third below-average tally from the annual winter dredge survey, in which Maryland and Virginia check for crabs waiting out the winter in bottom sediments in 1,500 spots around the Bay and in its rivers.

What's even more troubling is that the survey's estimate of juvenile crabs has also hit an all-time low, or nearly so, for two

years running. With so few young available to produce the next generation in a species that only survives a couple of years, a quick rebound looks iffy.

Crabs have been in deep trouble before, falling in 1998 into a decade of below-average abundance and subpar harvests. By 2008, Miller and other scientists thought they'd turned the corner by getting fishery managers to impose harvest limits intended to conserve female crabs so more could spawn. They set an overfishing threshold for females — "sooks," as crabbers call them — and a target number believed sufficient to rebuild the population and boost harvests.

At the time, it was the best available science, Miller said, "no doubt in my mind about that."

Now, he's not so sure.

A numbers game

It appears the fault can't be laid on crabbers this time. While overfishing female crabs was a problem in the past, the catch has stayed within bounds since 2008. The

adult female crab population has been 76% higher on average than it was in the decade before female-oriented harvest limits were set, Miller said.

Yet "recruitment" — the number of young crabs that make it from egg to adult — has not improved. Nor has the harvest grown in the way scientists and managers expected it would. In 2021, the Baywide commercial catch was 36.3 million pounds, well below the long-term average of 60 million pounds.

Miller said one statistic is especially troubling: The average number of young crabs reaching maturity for every spawning-age female has declined by 40% since female-oriented harvest limits were imposed.

"The blue crab stock is less productive than it was previously," he told the Potomac River Fisheries Commission in June.

Something appears to have changed. Or maybe the experts have missed something. In hindsight, Miller said he's concerned that they may have aimed too low in deciding how many females are needed to sustain the population.



A researcher counts and measures juvenile crabs during the annual winter dredge survey. (Dave Harp)

“I think at one level we have to bear responsibility,” Miller said. With female crab abundance suggesting the stock was sustainable, scientific and management attention focused more in recent years on restoring the Bay’s oyster population. “To an extent,” he added, “we’ve taken our eye off the ball.”

Crab reproduction is a numbers game. Females release their eggs in the saltier water near the mouth of the Bay, and each can produce up to 2 million larvae at a time. Yet only a minuscule fraction of those tiny crabs live long enough to produce the next generation.

First, they must survive being swept into Atlantic coastal waters before making their way back to the Chesapeake with the help of winds and currents. As they grow and move up the Bay, the little crabs become prey to fish, birds and even other crabs. They are especially vulnerable in that first year, when their growth prompts them to repeatedly shed outer shells and form larger ones.

Rom Lipcius, the Virginia Institute of Marine Science researcher who oversees that state’s portion of the winter dredge survey, said he’s concerned that too many egg-bearing females are still being harvested in the spring before they can make it to the spawning sanctuaries Virginia has established in the Lower Bay.

Others think part of the problem may be too few mates for the females. The number of “jimmies,” as watermen call adult male crabs, has also hit its lowest point since 1990. They’re down to one male for every 3.5 females, according to the survey.

Male crabs can and do mate with more than one female. But if they jump too quickly from one female to another, they can suffer from what researchers call “sperm limitation.” Scientists with the

Smithsonian Environmental Research Center in Edgewater, MD, have found that males deposit a smaller amount of sperm in the next female if they mated shortly beforehand.

That could be reducing the overall reproductive output of the Bay’s crab population 5–10%, said Matthew Ogburn, the lead Smithsonian researcher on that study.

Other scientists have doubted the significance of that. But Miller, who counts himself among the skeptics, said he thinks it’s time to take another look at the issue.

Predation

On this, scientists agree: Predators present a growing challenge for the Bay’s crab population.

Crabbers have long complained that Atlantic striped bass gorge themselves on the little juvenile crustaceans. In recent years, bigger fish with an appetite for crabs have drawn attention: red drum and blue catfish. The latter is an invasive species introduced for sport in Virginia decades ago. Initially believed to be limited to freshwater, they have since spread and multiplied throughout the Bay.

A VIMS study estimated last year that blue catfish are eating more than 2 million juvenile crabs a year in one stretch of the lower James River alone.

Based on an analysis of the stomach contents of more than 6,000 catfish caught there, each was eating a crab or more a day, on average, according to Mary Fabrizio, the VIMS fisheries scientist who led the study. An earlier study had estimated there were millions of catfish in that portion of the river.

“If you have a million fish eating one crab,” she noted, “that’s one million crabs removed.”

There likely are other forces contributing to the decline in the Baywide crab population, Fabrizio said, but that study indicates blue catfish could be “part of the picture.”

“There isn’t a simple, single answer,” she suggested. “I think it’s multiple factors and, definitely, predation is among them.”

With those and other possible culprits on their radar, scientists and fishery managers plan to gather later this year to try to figure out what’s going on. They agree that it’s high time for a new scientific analysis of all the available information and research. The last such stock assessment was in 2011.

If they conclude some external force like blue catfish is depressing crab numbers, fishery managers say their options are limited. There’s already a robust commercial fishery for blue catfish, and landings in Maryland and Virginia exceed those for striped bass, which is pound for pound a much more valuable fish.



Crabber Bubby Powley stands with a bushel of number 1 jimmy (male) crabs caught in mid-June on a trotline in the Honga River on Maryland’s Eastern Shore. (Dave Harp)

Harvest restrictions

Tightening crab harvest restrictions to conserve more of the broodstock, they say, is about all they can do.

“There are a lot of things we just don’t have control over, but we try to control what we can and hope for the best,” said Michael Luisi, acting fisheries director for the Maryland Department of Natural Resources.

Maryland and Virginia have already imposed catch restrictions for the rest of the year, hoping to ease fishing pressure on the skimpy crop of juvenile crabs that will start to reach legally harvestable size in late summer and fall. The curbs are mainly aimed at protecting more female crabs so they can spawn, though Maryland for the first time also capped crabbers’ daily catch of male crabs in August and September.

But more action is likely needed, many say, which lead to further restrictions next year. Some have suggested doing more to protect female “sponge” crabs, so called because of the egg mass visible on their underside. Virginia allows crabbers to keep a limited number during harvesting, and Maryland allows them to be imported from other states to be processed into crabmeat.

“Protecting those females that have a sponge, close to producing the next generation,” Miller said, “would make the most sense.”

Some think it also might help to give mature crabs of both sexes a little extra time to mate and spawn.

Both states require crabs to be at least 5 inches from tip to tip, though Maryland raises that to 5.25 inches from July 1 through the end of the season. At one time, the minimum catchable size in the Potomac River was even larger, 5.5 inches, a limit the bi-state fisheries commission might consider again as it weighs changes to its regulations.

Crabbers who have complained bitterly about harvest restrictions in the past are mostly resigned this time, though still wary that limits once imposed may never get eased.

Robert T. Brown Sr., president of the Maryland Watermen’s Association, called his state’s new catch limits a “knee-jerk reaction” to the poor survey results. After a slow start to the season, the harvest is picking up some, he maintained.

Still, he added, “we’re better overall to stay on the cautious side.”

Bubby Powley, who crabs via trotline in Dorchester County, said the new harvest limits taking effect in July aren’t likely to hurt him. But he expects the tighter caps on female crabs will pinch those who fish almost exclusively for them using hundreds of “pots” or wire cages in the fall.

Powley said he doesn’t doubt the crab survey results. He figures the harvest restrictions will help bring the population back.

“It’s not going to help our wallets,” he said, “but you got to do what you got to do.” ■

Spreading drilling waste on roads bad for health, environment

PA health study also found practice to control dust on unpaved byways to be ineffective

By Ad Crable

A long-anticipated health study commissioned by Pennsylvania environmental officials examined the practice of spreading wastewater from conventional gas- and oil-drilling on thousands of miles of rural dirt roads in the state. Researchers concluded that the practice doesn't control dust effectively and poses dangers to the environment and human health.

The state Department of Environmental Protection has not yet acted based on those findings but said that the study's impact will be "immediate, large and intense."

"While we must be willing to accept the trade-offs between the benefits of dust suppression and the drawback of environmental impacts, this research has found that oil and gas wastewaters only provide drawbacks," said William Burgos, a professor of environmental engineering at Penn State University and one of the lead authors of the study.

After a legal challenge to the practice in 2018 arising from environmental and health concerns, DEP temporarily banned most spreading of wastewater from conventional oil and gas drilling on the approximately 25,000 miles of dirt and gravel roads in the state. Spreading has never been allowed with wastewater from wells employing hydraulic fracturing, commonly known as fracking.

But for more than a half-century, spreading salty wastewater from conventional oil and gas wells was a cheap way for the industry to get rid of a byproduct, while reducing municipal costs for dust control in summer and road de-icing in winter. Twenty-one of the state's 67 counties allowed wastewater to be spread on rural roads before the temporary ban. Nationally, 12 states have permitted the practice.

According to DEP records, approximately 240 million gallons of drilling wastewater were spread on Pennsylvania roads from 1991–2017. Industry officials have long maintained the spreading did not have any adverse consequences.

For the independent study, commissioned by DEP, Penn State researchers conducted a series of laboratory experiments to test dust generation and suppression. They also measured the chemical makeup of wastewater and explored its runoff effects. The wastewater samples came from conventional



Lick Run Road in Lycoming County, PA, north of Williamsport, makes up part of the roughly 25,000 miles of dirt or gravel roads in the state. (famartin/CC BY-SA 4.0)

drilling operations obtained in confidence from western Pennsylvania oil service companies.

Poor substitute

The results showed that wastewater was essentially no more effective than rainwater in controlling dust, because its high sodium content does not allow road dust to bond to the material. In fact, the study noted, "sodium can destabilize gravel roads and increase long-term road maintenance costs."

The investigation also revealed health and environmental concerns.

Elevated levels of contaminants could pollute nearby water sources, the study concluded. In addition to increasing the salinity of fresh water, the water in some simulations contained heavy metals — such as barium, strontium, lithium, iron and manganese — at levels exceeding human health standards.

Some tests also found radioactive radium, a carcinogen, though often in low concentrations.

In response to the study, the Pennsylvania Independent Oil & Gas Association says there have been no reports of ill effects from the use of what it calls "brine water" on roads.

"As a practical matter," said the association's president, Daniel J. Weaver, "municipal government officials in many small northwestern Pennsylvania communities with limited resources and miles of unpaved roads have years of experience using brine water for dust control and have not reported impacts to the environment or wildlife."

DEP said it would host a presentation on the study's results with its Oil and Gas Technical Advisory Board and possibly propose new regulations on wastewater spreading by mid-July.

Spreading loophole challenged

The study wasn't the only blow to the future use of oil and gas wastewater on rural roads.

Even after the moratorium in 2018, DEP allowed drillers to spread wastewater if its makeup was similar to commercially available dust suppressants.

A review of state records by the Better Path Coalition environmental group found that 29 drilling companies used that loophole to spread 2.3 million gallons between 2018 and 2020. Twenty-one of those companies did not submit analyses of their wastewater, as required by the state. Of the eight that did, the tests did not show they qualified for the exemption, according to the group.

DEP agreed with the group's findings and said it would examine the applications and take enforcement action against violators, if any are found. "DEP agrees that the submissions are inadequate and continues to review, and will take enforcement actions as needed," an agency spokesperson said.

The department has advised 18 municipalities in four counties that they cannot allow the exemption for road application unless DEP verifies the applications.

Another wrinkle may involve the state Office of Attorney General. A consultant for conventional oil and gas operators

revealed in April to the state's Grade Crude Development Advisory Council that a special agent from the Attorney General's office had interviewed operators and consultants related to the exemptions.

A spokesman for the Attorney General's office told the *Bay Journal* that he could neither confirm nor deny that the office was investigating the possible illegal spreading of wastewater.

Scrutiny for wells

Pennsylvania's conventional oil and gas drillers are also facing scrutiny for abandoned wells that weren't plugged as required by law to prevent pollution.

A review by the Sierra Club found that DEP's initial list of abandoned wells set to receive \$400 million in federal funds for plugging assistance includes 7,300 wells that are currently listed as active, with identified owners.

DEP agreed the list contains some errors and said that the department would attempt to identify which wells have owners who could be held responsible.

Meanwhile, the Sierra Club filed a records request under the state's Right to Know law and found more than 4,270 notices of violations sent to drillers for abandoning oil and gas wells without plugging them.

The Pennsylvania Environmental Quality Board is considering a petition to increase the bonding amounts for both conventional and unconventional oil and gas wells to spare taxpayers the expense of plugging them when abandoned. ■

Chesapeake's underwater grasses saw slight rebound in 2021

Gains, losses vary throughout Bay and its rivers

By Karl Blankenship

The Chesapeake Bay's underwater grass beds rebounded a bit in 2021 after two consecutive years of declines, as the ecologically important plants expanded their range by 7%.

The annual Baywide aerial survey showed that the grasses, which provide critical habitat for juvenile blue crabs, fish and waterfowl, covered about 67,470 acres last year, up from 63,066 in 2020.

That's about 36.5% of the Baywide goal of 185,000 acres.

Like all plants, underwater grasses need sunlight, so clear water is critical for their survival and their abundance is a closely watched indicator of the Chesapeake's overall health.

Underwater grasses, or submerged aquatic vegetation, hit a recent record of 108,077 acres in the Bay in 2018. Then months of heavy rainfall resulted in a flood of murky water, causing back-to-back declines in 2019 and 2020.

Last year's figures were a mixed bag. Of the Bay's 93 segments, underwater grasses increased in 33, decreased in 35 and remained absent in 25.



Miles-Wye Riverkeeper Elle Bassett displays a clump of horned pondweed collected for seeds to help with restoration efforts. (Dave Harp)



Eelgrass saw a modest recovery in 2021 but has been in long-term decline because of poor water quality and its low tolerance for warmer water. (Dave Harp)

The largest expansion was in the Lower Bay, where eelgrass — one of the most critical of the roughly two dozen species found in the Chesapeake — staged a strong rebound.

Further north, overall acreage in Maryland declined by about 1%. But Susquehanna Flats, the largest grass bed in the state, and in the Bay, expanded 13%, to about 10,300 acres last year.

Another area with a large increase was Virginia's Mobjack Bay, where the Chesapeake's second-largest bed expanded from about 7,400 to 8,300 acres.

"There's not a single big story to tell," said Christopher Patrick, assistant professor of biology at the Virginia Institute of Marine Science, which conducts the annual survey.

"Nothing really bad happened at a Baywide scale," he said. "But on a more granular level, there's a lot of different things that were going on. Each area of the Bay has its own local story."

Maryland had losses in many tributaries on both sides of the Bay. Declines in some, such as the Choptank River and Eastern Bay, were driven by losses of widgeon grass, a species notorious for rapid expansions and contractions.

Brooke Landry, a biologist with the Maryland Department of Natural Resources and chair of the Bay Program's SAV Workgroup, said some of the Maryland declines seemed to stem from a loss of hydrilla, a

nonnative plant that thrives in freshwater and can rapidly expand its range.

Higher than normal rain in recent years reduced salinities in many areas, allowing hydrilla to expand, Landry said. That was reversed when salinities returned to normal. "I think what we saw last year is that hydrilla died back in some areas, probably because salinity increased just enough to knock it back a little bit," she said.

The survey showed that "underwater meadows" increased in all four salinity regimes of the Bay last year, the first time that has happened since 2015:

- The tidal freshwaters at the head of the Bay and in the uppermost tidal reaches of most tributaries saw an increase from 18,448 acres to 19,173, or about 4%.

- The slightly salty "oligohaline" waters, which occupy a relatively small portion of the Upper Bay and tidal tributaries, showed an increase from 8,231 acres to 8,397, or about 2%.

- The moderately salty "mesohaline" waters — the Bay's largest area of potential underwater grass habitat, stretching from near Baltimore south to the Rappahannock River and Tangier Island in Virginia, and including large sections of most tidal rivers — saw an increase from 22,686 to 23,768 acres, or about 5%.

- The very salty "polyhaline" water in the Lower Bay — from the mouth of the

Rappahannock and Tangier Island south, including the lower York and James rivers — had an increase from 13,701 acres to 16,132 acres, or about 18%.

The news in the polyhaline was especially good as it was driven by a modest recovery of eelgrass, a critical species that dominates high-salinity areas of the Chesapeake.

Eelgrass is the only type of grass found in many areas and is especially important for some species, including juvenile blue crabs. It has been in a long-term decline because of poor water quality and its low tolerance of warm temperatures, which have been increasing in the Bay.

"Temperatures were not too hot this past summer, giving the eelgrass a chance to bounce back," Patrick said.

Underwater grasses are such an important part of the Bay ecosystem that much of the region's effort to reduce nutrient pollution is aimed at controlling algae blooms to help clear the water so the grasses can thrive.

Scientists estimate that anywhere from 200,000 to 600,000 acres of grasses once grew in the Bay, but by 1984, when the aerial survey began, that had diminished to just 38,227 acres.

Besides providing important food and shelter for many species, underwater grasses pump oxygen into the water, trap sediment and buffer shorelines from the erosive impact of waves. ■



The case of the missing chickens

Oversight highlights growing worries about Bay cleanup data

By Karl Blankenship

Driving down Oxford Road north of Gettysburg, PA, Hillandale Farms is hard to overlook.

Two-story chicken houses, each longer than a football field, line the road. Inside, and at Hillandale's other nearby poultry houses, are more than 5 million chickens, each churning out one egg roughly every 26 hours.

Hillandale produces eggs for almost all markets: regular, organic or cage-free. It is the fourth largest egg-producing operation in the nation and the largest livestock operation in Pennsylvania.

But there is one place where Hillandale's chickens are absent: In data that the state-federal Chesapeake Bay Program uses to help estimate the amount of nutrients reaching the Bay.

Each year, Hillandale chickens produce about 5 million pounds of nitrogen — the most problematic form of nutrient pollution in the Chesapeake Bay — in their manure. That's roughly a pound per chicken and more than is discharged annually by the Blue Plains Regional Wastewater Authority, the world's largest sewage treatment plant, located outside Washington, DC.

"We've had all these birds here, and have for a number of years, and we didn't exist," said Ron Ballew, senior manager of the Hillandale operation, which voluntarily reported the data.

It's unclear, in the context of the entire Bay watershed, how significant the Hillandale oversight is — a computer model estimate suggested only a portion of its nitrogen enters the Bay.

But with the region far off pace to meet its 2025 cleanup goals, accounting for the Hillandale chickens would make that job even tougher.

That likely won't happen until at least next year. After months of discussions, Bay Program partners were unable to agree on how, or whether, the chickens should be counted.

And the problem may extend beyond Hillandale. While remarkable primarily because of its sheer size, Hillandale is probably not the only animal operation that is missed or improperly counted, some Bay Program staffers believe.

Yet the Hillandale oversight is a highly visible illustration of growing concerns among states regarding the accuracy of key data the Bay Program uses to assess progress as its 2025 pollution reduction deadline approaches. The issue has flared at various Bay Program meetings recently, often without resolution.

It's worrisome because getting people to embrace and fund nutrient reduction projects requires trust in Bay Program information — and in what it says about the status of the Bay cleanup.

"We are talking to our counties, our local stakeholders, the landowners, getting them

to buy in to invest their own time, resources, labor and money," said Jill Whitcomb, director of the Pennsylvania Department of Environmental Protection's Chesapeake Bay Office.

"It's a challenge," she added. "We can't be convincing because we're not necessarily having a lot of confidence either."

Watershed of data needs

The nutrients nitrogen and phosphorus reach the Bay from a 64,000-square-mile watershed that drains parts of Delaware, Maryland, Pennsylvania, New York, Virginia and West Virginia, and all of the District of Columbia.

Determining the amount that enters the estuary — spurring algae blooms that cloud the water and cause oxygen-starved "dead zones" — is central to the work of the Bay Program, which includes all of the jurisdictions in the watershed, the U.S. Environmental Protection Agency and Chesapeake Bay Commission, which represents state legislatures.

Those estimates are derived from complex computer models using massive amounts of information about wastewater discharges, applications of fertilizer and animal manure to crop fields, atmospheric deposition and other nutrient sources. It also uses information about state actions that reduce that pollution, such as the planting of cover crops and streamside buffers and upgrading wastewater plants.



Top: A view of the "Site 5" chicken houses at Hillandale Farms near Gettysburg, PA, seen from the adjacent EnergyWorks plant. (Dave Harp)

Inset: Concentrated feeding operations for chickens and other livestock are a source of nutrient pollution in the Chesapeake Bay and its tributaries. (U.S. Department of Agriculture)

The resulting estimates influence how hundreds of millions of dollars are spent to reach Bay cleanup goals.

Getting uniform, reliable data to feed into the model has long been a challenge. Decades ago, states reported having more acres of cropland under nutrient management plans than actually existed.

Over the years, the Bay Program has worked to standardize data and methodology across states. Still, there has been ongoing concern about the data used to determine the amount of nitrogen (roughly 650 million pounds annually) applied to farms, lawns and other landscapes in a



Patrick Thompson, CEO of EnergyWorks, a manure-to-energy plant located next to Hillandale Farms, stands in the facility before a lack of funding forced its closure in 2017. (Dave Harp)

typical year, as animal manure, biosolids from wastewater treatment plants or purchased fertilizer.

Data on manure inputs come from several sources, including the U.S. Department of Agriculture's farm livestock population estimates. Fertilizer sales data is collected by the Association of American Plant Food Control Officials.

The processes for using that information in the Bay Program's computer models were signed off on years ago, though it was recognized that the data, collected for other purposes, weren't perfect.

"Everybody acknowledged that, 'Hey, there are issues here,'" said Norm Goulet, senior environmental planner with the Northern Virginia Regional Commission who chairs the Bay Program's Urban Stormwater Workgroup. "But we've got to use something. The question then becomes, OK, what is that something?"

But problems, like the missing Hillandale chickens, often emerge over time.

Fixing problems is complicated because of the Bay Program makeup. Its committees, workgroups, task forces and action teams include a range of state and federal representatives, as well as nonprofit organizations, local governments and other stakeholder groups.

Committee decisions require a consensus, not a majority. And when the missing Hillandale data was discovered, it was not incorporated because there was no consensus on how to do so. When problems were identified in urban fertilizer figures this spring, it could not be resolved. A two-year effort to improve the tracking of runoff

control practices recently failed to reach an agreement on changes.

Often, nearly everyone agreed the data were problematic. They just couldn't agree on a fix. Without consensus, old data and procedures remain.

"I think that we've tried to use the best available data to track inputs to the model, and certainly there's good reason to take that approach," said Joe Wood, senior scientist with the Chesapeake Bay Foundation's Virginia office who participates on several Bay Program committees. "But that's led to some real challenges, too. 'Best available' is not always good enough."

Concerns about fertilizer data have been around for years, but they recently came to the fore when the latest figures — which were already 5 years old — showed a sharp uptick in use.

The impact was particularly significant for farms. Computer model estimates showed that the annual amount of nitrogen reaching the Bay from farms had been reduced by 5.7 million pounds since 2009. When new data, along with other smaller updates, were included into the modeling, that figure was reduced to about 400,000 pounds — nearly erasing, at least on paper, more than a decade of efforts.

In an unusual move, the Bay Program's Water Quality Goal Implementation Team — the committee most directly involved in nutrient reduction efforts — sent a letter to the broader partnership expressing "multiple concerns" with the fertilizer data. Those included the potential for double-counting nutrients, assumptions that fertilizer is applied the same year it is bought and other issues.

The fertilizer data, said Frank Schneider of the Pennsylvania Conservation Commission, is collected primarily for issues related to consumer protection and ensuring products are properly labeled. "Getting that information and then trying to put it into the water quality realm, it's like trying to put a square peg in a round hole."

Wood agreed that the data need to be carefully evaluated but said that should be a consistent process, not just when they produce results people don't like. "We can't have a system that when things look hard, all of the sudden we change our system," Wood said. "We need to have a process that is not influenced by the outcomes."

The missing chickens

One piece of information is still missing in the updated computer estimates: the Hillandale chickens.

To help deal with the waste from those chickens, the company has supported the development of a manure treatment facility, EnergyWorks, adjacent to its Adams County site. EnergyWorks can eliminate much of the ammonia emissions related to manure storage and field applications, while also reprocessing manure into fertilizers that are more easily transported out of pollution hotspots and can be applied to fields with a higher rate of precision.

But the facility requires multiple funding streams to be viable. For several years, it was partially supported by selling nutrient reduction credits to the Brunner Island Steam Electric Station on the Susquehanna River, but that ended in 2017. Without enough funding, it ceased operations.

While working to find a buyer for nutrient reduction credits, Pat Thompson, president of EnergyWorks, learned the Hillandale chickens weren't included in the Bay Program database. He was, in effect, trying to get credit for reducing pollution at a facility that, in the Bay Program system, did not exist.

At that point, Hillandale provided its production data to Pennsylvania officials, who urged the Bay Program to research the matter.

The Bay Program uses livestock population estimates from the U.S. Department of Agriculture. Its 2017 Census of Agriculture — the most recent available — estimated there were 210,832 egg-producing chickens, or "layers," in Adams County, where Hillandale's main operation is located. But the company, in data reported to the Bay Program, said it had 4.7 million chickens — 22 times more.

In adjacent York County, the census reported 274,532 layers. But Hillandale's

operation in that county reported 1.2 million — 4.5 times more.

At first, Bay Program staffers thought that was explained by the way the USDA reports data. When there are only a few facilities in a county for a particular type of livestock, the department does not list results for the county to protect confidentiality. Instead, those populations are typically reported at the state-scale.

"That has some constraints of what we're able to do or share with anyone," explained Travis Averill, chief of the livestock branch of the USDA National Agricultural Statistics Service, at a recent meeting. But "when we're collecting data it gives us a little help for producers, knowing that their information is protected."

When staff began crosschecking statewide figures with other sources, such as concentrated animal feeding operation permits, it appeared that Hillandale's chickens were not included anywhere.

"That's a really significant difference. It didn't show up in the statewide data, either, which is where normally it should," said Mark Dubin of the University of Maryland, who is the Bay Program's senior agricultural adviser. "For whatever reason, we don't know why, the numbers aren't there."

Dubin spent months meeting with Hillandale representatives, county conservation district staff and others to piece together the missing data from 1995 to 2021. While the Hillandale layers were not accounted for, other small layer operations in the two counties were included.

It's unclear what happened. Averill said the USDA had statistical procedures to account for the presence of unusually large facilities or those that do not respond to the department's surveys.

Ballew, of Hillandale, says the company regularly reports data to the USDA.

Widespread impact

When Bay Program modelers included the Hillandale chickens, they found that the amount of nitrogen reaching the Bay had been undercounted by more than 200,000 pounds a year.

And because those chickens produce more manure than is needed to fertilize crops in Adams or York counties, it is largely transported elsewhere for use. That triggers other adjustments in the model regarding field application rates for manure and chemical fertilizers. When it was all factored in, estimates showed higher nutrient loads not only from Pennsylvania, but also Maryland and Delaware.

The impact of the missing chickens would be enough to offset more than half of the

nearly 400,000 pounds of nitrogen reduction achieved by the entire agricultural sector in the Bay watershed since 2009 — if they were included in the latest modeling.

But, officially, they're not. When the issue repeatedly came up in Bay Program committees last year, there was widespread agreement that the missing data were problematic, but members were unable to agree on a solution.

Most, including those representing Pennsylvania and the EPA, supported incorporating the data. But some worried about changing the procedures for gathering livestock information, especially if it involved industry sources.

Not an isolated incident?

Hillandale may not be the only missing facility in USDA data, Dubin said.

As a concentrated animal feeding operation, or CAFO, Hillandale is required to have a federal permit. But smaller operations wouldn't necessarily have such publicly available documentation. A county could have three or four operations of 50,000 chickens each, for instance, and they would not show up in USDA county figures — and they wouldn't be required to have a federal CAFO permit that could verify the data.

CAFO permits don't provide the full picture, either. They only capture a portion of the livestock population. In Lancaster County, PA, for example, those permits don't even cover half of its sizable dairy population.

Further, numbers in a CAFO permit may not accurately reflect the livestock population, Dubin noted. For instance, operators often overestimate the number to avoid being in violation of their permits. "You can easily introduce a degree of error by looking at just CAFO permits alone," Dubin said.

The Bay Program chose to use USDA data because it provided the most complete picture, with a consistent methodology, across the region. But no system captures the entire livestock population, Dubin said, and it's likely that animals are undercounted in some places and overcounted in others.

In 2016, the Bay Program supported work by Virginia Tech and Penn State University to collect industry data on commercial hog production in Virginia and Pennsylvania. That study showed that USDA figures overcounted the animals by about 6%.

At around the same time, another Bay Program-supported study involving Virginia Tech and the U.S. Poultry &



Mark Dubin, the Chesapeake Bay Program's senior agricultural adviser, stands in a cornfield on his family's farm in Ingleside, MD. (Dave Harp)

Egg Association found that USDA turkey estimates in Virginia and West Virginia were overestimated by about 27%.

Such errors have other impacts. In Pennsylvania, for instance, some activities, such as manure transport or the construction of manure storage facilities, may not get counted toward nutrient reduction efforts. That's because the figures for some locations indicate that too little manure is generated to justify the need for those practices.

"If the animals aren't 'there,' they're not producing manure," said Whitcomb, of the Pennsylvania Department of Environmental Protection. "And then we're not able to account for the storage of that manure."

Sometimes, the practices can be counted at a broader geographic scale, but then they get reported in the wrong county. That's problematic in Pennsylvania, where each county has its own cleanup goal. "The county that actually did the work doesn't necessarily get the credit for that work," Whitcomb said. "It can go somewhere else."

Getting better data

One way to obtain better livestock data might be to get it directly from major livestock industries, but that is often complicated by privacy issues.

Paul Bredwell, executive vice president of the U.S. Poultry & Egg Association and a member of the Bay Program's Agriculture Workgroup, has been working with the chicken broiler industry on a research project with the University of Maryland and Virginia Tech to determine if they can collect more accurate information.

Bredwell, who worked with Dubin on the Virginia turkey project, said if the effort produces information that the industry believes is more accurate, he believes they will work with the Bay Program on an ongoing basis — whether it shows a greater, or lesser, impact on nutrient pollution.

Bredwell supported the use of Hillandale data, even though it showed a greater impact than previously estimated. "That's a part of our footprint," he said. "So we want to be responsible for it."

Dubin said industry data need to be crosschecked against public information, such as CAFO records and nutrient management plans. Not all nutrient management plans are public, though. Where they aren't, Dubin said producers in earlier projects signed consent forms allowing researchers to verify data with their plans.

"That's important because then I can say I didn't just get information from a private entity or individual," Dubin said. "I received information that was collaborated by other sources."

If the latest project is successful, Dubin said, the biggest impediment to using the data could be the Bay Program. Updating and crosschecking information on an annual basis would require more investments — possibly several more staff positions as well as more support at the state level, he said.

Although results from the hog and turkey studies differed from USDA data, Bay Program participants opted not to use it in part because there was no way to continue collecting the data.

The question, Dubin said, is whether "the partnership wants to invest more resources into more fully developing these avenues. That is the question."

Wood, of the Bay Foundation, said he was open to using industry information as long as there are measures to ensure its quality. And, he said, other options should be explored.

"I think you could make a pretty good case that resources should be invested to improve data," Wood said. "A lot of the conversations instead are, 'Well, how should we use this data that we do have.'"

The Bay Program has invested signif-

icantly in some data upgrades, such as high-resolution images to track land use, but it has not made similar-size investments to improve its nutrient input data.

It's not just livestock numbers and fertilizer amounts that raise concerns. Basic information, such as nutrient concentrations in manure, are often drawn from decades-old studies, even though feeding practices, animal housing conditions and other factors that could influence those numbers have changed.

"We run into a lot of things like this," said Jeremy Daubert, an extension agent with Virginia Tech who chairs the Bay Program's agricultural workgroup. "We think something is happening, but we don't have any good research."

Wood said better information is also needed to verify nutrient control activities. It's a costly, time-consuming process, and many believe the current system results in undercounts.

Wood said improving such data may not mean spending more money but spending it better. Instead of sending individuals to verify pollution control practices, he said, aerial surveys might do the job.

The recent controversies have brought more attention to the data issue. In a memo to Bay Program participants, Adam Ortiz, director of the EPA's Mid-Atlantic Region, acknowledged the concerns and urged them to "look at data and methods that are replicable across the watershed and jurisdictions." That could mean directing "additional resources" to the agricultural workgroup, he added.

Dubin said such investments could reap rewards. "At the end of the day, regardless of what the impact is ... if we can increase the confidence of the results, that's where you get people to believe in the results and buy in and implement what you're asking them to do." ■

Will data centers imperil drinking water in Northern VA?

Experts detail Occoquan Reservoir's mixed health, say salt levels are rising

By Whitney Pipkin

Can data centers and drinking water go together? That's one of the questions before a Northern Virginia county board considering whether to welcome hundreds of acres of such development to a watershed that serves as a major source of drinking water for the region.

The Prince William County Board of Supervisors is mulling a new comprehensive plan that would make room for the massive data centers that have generated millions of dollars in tax revenue for nearby Loudoun County. But water experts made presentations at a June 7 board meeting, some of them urging the board to study any potential impact those projects could have on the Occoquan Reservoir.

Created by a dam in the Occoquan River, the reservoir supplies 30–40% of the drinking water to the Fairfax County Water Authority, which serves more than 2 million people in the region.

During the board meeting, though, only the member who had called for the water presentations, Jeanine Lawson (R-Brentsville), spoke in favor of further study. The board made no motions calling for such an investigation.

"In my opinion, the best way to prevent [pollution of the Occoquan Reservoir] is to protect the watershed by preventing intense development," Lawson said.

A report commissioned by the National Parks Conservation Association and released in May concluded that proposed data centers would contribute "hundreds of millions of gallons" more polluted runoff to waters that run into Manassas National Battlefield Park, Prince William Forest Park and the Occoquan Reservoir.

The eight-member Prince William board is considering three separate proposals that would greatly expand the footprint of data centers in the county, which borders Fairfax County to the northeast, as part of a new comprehensive plan.

But the most controversial proposal has come not from county planners but from a coalition of residents. Despite living in an area known as the "rural crescent" — a C-shaped stretch of previously protected land enveloping the county's edges — they see the conversion of their properties near the Interstate 66 corridor as inevitable and would like to sell them to data center developers.



Roger Yackel, a resident of Prince William County, VA, commented on data center proposals at a June 7 meeting of the county's Board of Supervisors. (Whitney Pipkin)

Their proposed "Prince William Digital Gateway" would rezone more than 2,000 acres of land next to Manassas National Battlefield currently designated for agricultural and environmental uses to "technology/flex." This land conversion would be in addition to a proposed expansion of the county's data center overlay, land set aside for such development near related infrastructure, and to sweeping changes proposed in the county's new comprehensive plan.

Almost all of the Digital Gateway's 2,133 acres drain to the Occoquan Reservoir. The 14-mile-long waterbody forms the border between Prince William and Fairfax counties and is considered a shared resource. The other major source of drinking water for the region is the Potomac River.

The land that makes up the proposed Gateway also includes about 5% of the watershed of Bull Run, a tributary to the Occoquan Reservoir, and roughly a half a percent of the Occoquan Reservoir watershed as a whole, said Normand Goulet, senior environmental planner and Occoquan program manager for the Northern Virginia Regional Commission.

Goulet, who runs a longtime model that can help project the future health of the reservoir, said land use is the biggest determining factor of water quality. More development, and pavement, can increase certain types of pollution in the water, including salt.

In a March letter to the county board,

Jamie Bain Hedges, general manager of the public utility Fairfax Water, raised concerns about the potential changes: "As the most populous jurisdiction in the Occoquan watershed and the one with the largest land area, substantial changes in land use patterns in areas of Prince William County will impact water quality in the watershed and reservoir."

The Occoquan Reservoir is in relatively good health today, the water experts told the board. But that has not always been the case.

The reservoir was so polluted by development and poor sewage treatment in the 1960s and '70s that the state stepped in to address the problems. Several smaller sewage treatment plants in the area were consolidated into the Upper Occoquan Service Authority.

Located in the northern part of Prince William County, the wastewater plant discharges treated water to Bull Run.

"This was one huge experiment," said Tom Faha, director of the Virginia Department of Environmental Quality's Northern Regional Office. "We were taking all of our wastewater for the area and treating it and discharging it into one of our primary water supplies."

To oversee the results of that experiment — which at the time included a suite of new water quality regulations — the state created the Occoquan Watershed Monitoring Lab in 1972. The lab has been

collecting water quality data ever since, recording the success of that early effort to recharge a reservoir using wastewater.

Wastewater treatment and runoff control practices have helped the reservoir maintain water quality over the years. But new threats are emerging.

Levels of salt in the freshwater reservoir have been steadily rising over the last decade and, in recent years, have begun to "routinely exceed" federal drinking water advisory levels for taste and low-salt diets, according to Fairfax Water. Removing salt like other pollutants at wastewater treatment plants would be energy intensive and cost prohibitive, the experts said.

Sources of the pollutant include runoff from road salts, powdered detergent byproducts making their way through wastewater treatment, and cooling systems that use salt as a disinfectant at places like data centers.

Stanley Grant, director of the Occoquan Monitoring Lab, is studying solutions for rising salinity in streams across the United States through research funded by the National Science Foundation.

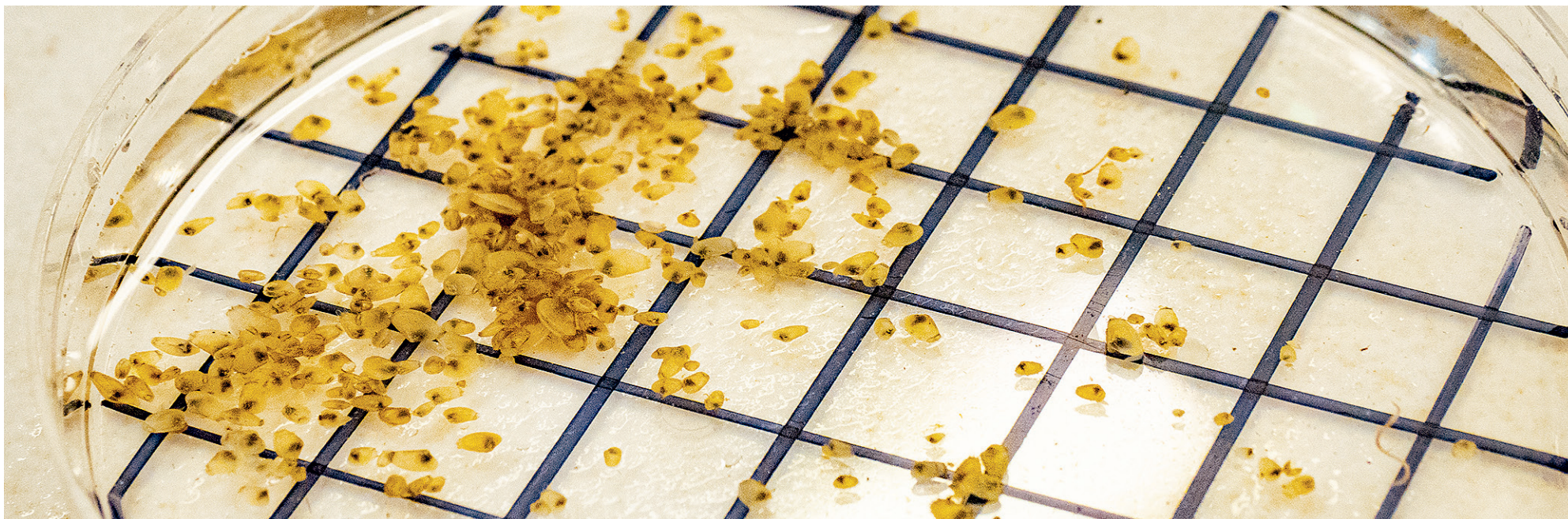
He said there are opportunities to balance development with the need for safe drinking water. But salt is a tricky pollutant because it's hard to remove.

"As we develop this watershed, if we don't do it in a really smart way, we could end up at a point where the reservoir has just kind of reached its tipping point," he said. "At that point is a really bad point to start planning."

In 1982, in part to protect the Occoquan Reservoir as a source of drinking water, Fairfax County's Board of Supervisors voted to restrict development on nearly two-thirds of its 65,500 acres adjacent to the reservoir. The downzoning was the first of its kind in the populous county to survive a court challenge, according to a *Washington Post* article at the time.

When Lawson brought up Fairfax's downzoning decision during the Prince William board's June meeting, Board Chair Ann Wheeler said the time had passed for Prince William to make a similar decision.

"It's too late for us, because we built 450 homes on our reservoir," Wheeler said, referencing the county's Lake Ridge community. "But, yes, it would have been nice." ■



Microplastic research gears up at Morgan State University

Researchers look at particles in marine life that could reveal human health impacts

By Whitney Pipkin

Carol Adrienne Smith thinks jellyfish have a lot to teach us about microplastic pollution in the Chesapeake Bay. And, thanks in part to a \$1 million grant from the National Science Foundation to her historically Black university, she's asking questions and getting some answers.

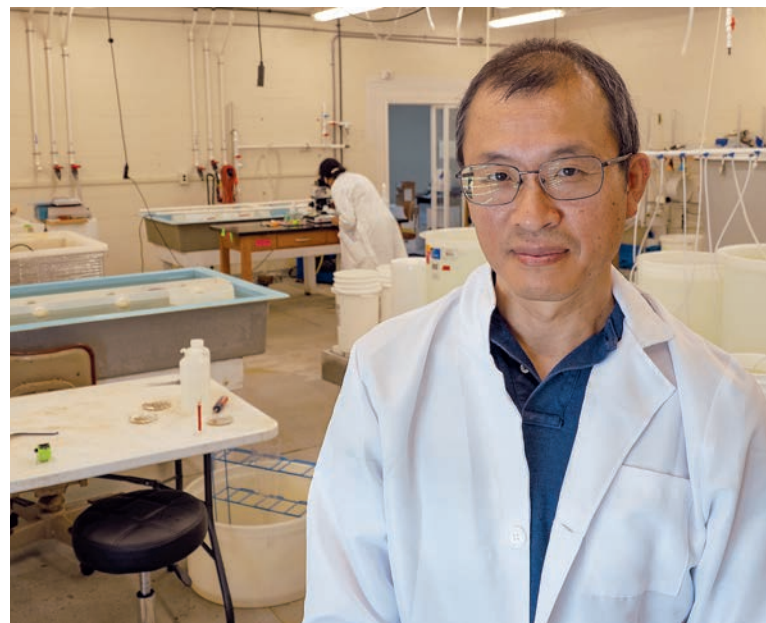
Smith is one of five post-graduate students at Morgan State University in Baltimore who are benefitting from a federal grant that arrived in early 2021. The funding has two major goals: to increase the capacity of science and engineering programs at historically Black colleges and universities like Morgan State, and to invest in the growing field of microplastics research.

"Specifically, we want to locate the source, distribution and abundance of microplastics in the water and the impact on the coastal ecosystem," said Chunlei Fan, a professor and director of the bioenvironmental science Ph.D. program at Morgan State.

Much of the work is being done at PEARL, the university's Patuxent Environmental and Aquatic Research Lab. Its location on the Patuxent River in Calvert County, MD, 80 miles south of Baltimore, gives students and researchers access to labs and water samples in both urban and rural areas. And that's a big advantage when trying to understand how plastic pollution gets into Chesapeake Bay waters.

"I was thrilled when we received this grant," said Scott Knoche, director of PEARL and an environmental economist. "One of the things I'm constantly aspiring to do is connect PEARL to Morgan's main campus education. Being 80 miles south — a two-hour drive on a good day — can be quite tricky."

Knoche said he hopes to add more on-site housing near PEARL so students can easily stay overnight for field work.



Top photo: Tiny softshell clam larvae grow in a dish at PEARL — the Patuxent Environmental and Aquatic Research Laboratory of Morgan State University. (Dave Harp)

Middle photo: Carol Adrienne Smith, a doctoral student at Morgan State University, studies the presence of microplastics in jellyfish. Here, a magnified slide shows tiny plastic particles embedded in the tentacles of a Bay nettle. (Dave Harp)

Bottom photo: Chunlei Fan, a professor and director of the bioenvironmental science doctoral program at Morgan State University, stands in the PEARL hatchery. The hatchery hosts research on oysters and softshell clam propagation.



Sulakshana Bhatt, a postdoctoral research associate at Morgan State University, adds droplets to a microscope to look for tiny oyster larvae at the university's lab. Bhatt is studying how the presence of plastics impacts oysters. (Dave Harp)

Tiny plastics, tough questions

Scientists have long suspected that the tiny plastic particles floating in the Chesapeake Bay and its rivers — consumed by a growing number of aquatic species — are anything but harmless. Studies and workgroups in the region are beginning to clarify the connections between the presence of microplastics and the harm they could be causing in the Bay and its species.

Globally, microplastics have been found in the air we breathe, the food we eat and our organs and blood. It's possible, some studies have suggested, that humans are ingesting a credit card's worth of microplastics every week. One of the ways people consume plastics is through eating seafood, though the tiny particles can also be swirling around in tap and bottled water. Assessing the risk of plastic consumption by humans is an important research goal.

At PEARL, the federal science funds have helped outfit the lab with a specialized infrared microscope that can rapidly identify different types of plastics in a water sample. A grant from the microscope's maker, Shimadzu, also helped the university obtain the equipment.

To qualify for the grant from the National Science Foundation — through a program called HBCU-RISE (Historically Black Colleges and Universities Research Infrastructure in Science and Engineering) — the college needed to have existing doctoral programs in environmental science and engineering. Morgan State has 50 students enrolled in its environmental sciences Ph.D. program, Fan said, as well as about 100 undergraduates on that track.

The federal grant has elevated Morgan State's status to compete for additional funds with the goal of becoming a local epicenter for microplastics research. The university recently secured a separate grant from the National Institutes of Health to look at how microplastics accumulate in oysters and the potential impacts on humans who eat them.

PEARL is an asset for the NIH grant, too, because it includes a small oyster hatchery. The university received federal funding in 2008 that allowed it to re-engineer the ground floor of PEARL, located at the Jefferson Patterson Park & Museum, to create the hatchery.

Since then, work at the hatchery has focused on refining best practices for oyster aquaculture. It has also helped to develop oyster varieties that are ideal for Maryland waters and explore alternative substrates for oyster reefs, such as highway construction debris. A new project is studying the prospects of softshell clam production to give Maryland watermen another option beyond oysters.

The NIH funding asks the lab to investigate whether microplastics of various types and sizes pass through oysters or bioaccumulate in their tissue. The findings could have implications for human health, helping experts to discern if oysters, as filter feeders, could be a primary source of microplastics in people who consume them.

"We know there are lots of microplastics in the natural water, but is the oyster only taking in a specific type of microplastic in a certain size range?" Fan asked. "We don't know yet. That is something we want to find out."

For that work, the oysters studied at PEARL will be harvested from wild reefs instead of aquaculture settings. But Morgan State researchers like Sulakshana Bhatt, a post-doctoral student, also plan to study how lab-grown oysters fare in tanks containing microplastics, compared with those grown in plastic-free water. The work will look at the larval health of the oysters as well as growth and feeding behavior.

Jellyfish vectors

Carol Adrienne Smith studied integrated biology at the University of California at Berkeley before arriving at Morgan State.

"I have two master's degrees, and I love the ocean," she said. "I've found it very supportive here at the school to do the lab work I want to do."

Smith decided to study the presence of microplastics in Bay nettles (*Chrysaora chesapeakei*), the most common type of jellyfish in the Chesapeake during the summer months. She rigged a metal colander and metal pole into a device she can use to catch jellyfish off the lab's nearby dock, and she has collected specimens during outings on PEARL's boat.

When studying jellyfish at the lab, Smith found that their tentacles were peppered with several types of microplastic particles, many of them likely embedding themselves in the tentacles as the animals swam through the water. The jellyfish could also be ingesting the particles, which are small enough to pass through barriers in its body, but more research is needed.



Brittany Wolfe, shellfish hatchery manager at PEARL, holds up a dish of softshell clam larvae. (Dave Harp)



Tameka Taylor, a doctoral candidate at Morgan State University, uses a high-tech microscope at the school's Patuxent River lab to study how chemicals adhere to and detach from plastic particles. (Dave Harp)

She also found that harmful chemicals had adhered to the surface of some of the tiny plastic particles in the jellyfish. This finding adds to a body of evidence that plastic particles in the water could serve as vectors for dangerous chemicals, such as benzene, to contaminate other animals up and down the food chain, including the humans that consume them.

"The effects of these chemicals on humans are well-studied, but we want to understand how they do or don't affect jellyfish," Smith said. "Jellyfish have been around for hundreds of millions of years, so they've survived a lot."

Two papers Smith has written about her research are being peer-reviewed for publication.

Tameka Taylor, a Ph.D. candidate at Morgan State who also works in an unrelated area of plastics pollution at the U.S. Environmental Protection Agency, is also interested in the relationship between plastics and chemical contaminants.

Taylor is reviewing existing literature about how microplastics act as carriers for chemicals in the water. Studies in other states have demonstrated that per- and polyfluoroalkyl substances (PFAS) and other chemicals can easily catch a ride on plastic particles by becoming embedded in tiny crevices.

Taylor is particularly interested in the processes that cause those chemicals to be released from a particle's surface. For example, if an acidic environment triggers a release, does that mean that the chemicals could be activated by human stomach acid after consumption?

"If you're ingesting microplastics — which we are, we all are — what are the implications of that?" Taylor asked. "I want to study absorbing and desorbing these compounds."

Chunlei Fan said that students who participated in these programs at Morgan State have gone on to jobs in the emerging field of microplastics research at the EPA and National Oceanic and Atmospheric Administration.

"In the future," Fan said, "we expect to study not only the ecological impact but also the impact to public health. We think [those impacts] could be great." ■

Old breakwaters eyed as future realms for oyster castles

As sea levels rise, researchers try living remedy for failing shoreline erosion barriers

By Timothy B. Wheeler

What can you do when breakwaters break?

It has long been common practice for waterfront property owners to build offshore reefs or seawalls out of stone, concrete or wood to keep wind-driven waves from eroding their shorelines. But storms over the years have worn down many of those breakwaters, and rising sea level is gradually compromising even the sturdiest of them.

Repairing or replacing failing breakwaters can be costly, and it temporarily disrupts submerged grasses and bottom-dwelling marine creatures.

Now, researchers with the University of Maryland Center for Environmental Science, working with the National Wildlife Federation, are trying out a greener, potentially less pricey alternative. They're topping those eroding structures with "oyster castles," interlocking concrete blocks seeded with bivalves that can be put together to mimic natural oyster reefs.

"[There are] hundreds of breakwaters throughout the Chesapeake Bay," said Matthew Gray, an oyster researcher at UMCES' Horn Point laboratory in Cambridge who is leading the effort. Some of those wave barriers have already been battered down and submerged beneath the water's surface, he said. And with some studies projecting 2 feet of sea level rise by 2080, many more are likely to be drowned and rendered ineffective in coming years.

"So if this works," he added, "that's a way we could green the gray infrastructure and prolong its effectiveness."

Oyster castles are being tried in a number of places as part of "living shorelines," more plant- and wildlife-friendly alternatives to the bulkheads or stone revetments often used to armor the waterfront against erosion. Using them to rehabilitate failing breakwaters presents new opportunities — and challenges.

Standing waist-deep in water, Iacopo Vona, a graduate research assistant at Horn Point, struggled to keep his footing as he hefted an oyster-encrusted block from an idling motorboat. With a splash, he plunked it atop a submerged pile of rocks that years ago had been installed as a breakwater at the inlet to a shallow cove



Above: Amanda Poskaitis of the National Wildlife Federation helps University of Maryland researcher Matthew Gray put "oyster castles" together on an old breakwater in Maryland's Choptank River. (Dave Harp)

Right: An oyster-encrusted castle placed atop an old breakwater nearly breaks the water's surface in an inlet off the Choptank River. (Dave Harp)

off the Choptank River.

"No guts, no glory!" called Richie Long, the laboratory staffer piloting the boat, as Vona lost his battle for balance at one point and went down in the water.

Soaked but undeterred, Vona and others on the research team labored the next two days until they had placed about 60 oyster castles on the uneven bottom, layering them high enough to break the surface of the water.

The project is underwritten with a pair of \$50,000 grants — one for design and development via the National Fish and Wildlife Foundation and the other for the

castles to better secure them against storms.

"Almost miraculously, it really fit together on that particular breakwater system," said Amanda Poskaitis, Mid-Atlantic coastal resilience program manager for the National Wildlife Federation. The Virginia-based conservation organization has partnered with UMCES on the project because they hope it will be useful not only throughout the Bay but in coastal areas elsewhere.

Researchers will study the rebuilt breakwater's effectiveness at dampening wave energy. But they're also anxious to see if the oysters clinging to the castles survive and multiply, so they can do at least a bit to help clean up nutrient pollution in the Chesapeake Bay.

Lab tests have shown that when the concrete castles are covered with bivalves or other filtering organisms like barnacles, they pull nitrogen from the water at "exceptionally high rates," said Jeffrey Cornwell, a research professor at Horn Point who's studied the nutrient removal capabilities of oysters.

The overall nutrient removal of these castled breakwaters will be relatively limited, Cornwell cautioned, because they're not likely to occupy a large portion of the Bay and its tributaries. But if significant filtration rates can be verified in the field, he added, that could make it worth offering financial incentives to waterfront property owners or others needing pollution removal credits for enhancing breakwaters this way.

Another limitation for such projects in Maryland may be the state's cold winters. Oysters die if exposed to freezing air temperatures, so bivalves on castles that project above the water at low tide are at risk. But Gray pointed out that the castles used to build the pilot project had large oysters on them that had survived because the past few winters had been relatively mild.

That vulnerability won't be an issue farther south, Poskaitis noted, where freezing temperatures are rarer. For that reason, she said, she expected these breakwater enhancements to work even better along the coast of the Carolinas.

"Of course, [with] some breakwater systems, it's not going to work," she added. "But we think that using different types of oyster structures could really be a way to increase habitat and resiliency in offshore breakwaters." ■



actual work, from the Palmer Foundation, a private nonprofit named for the first president of Snap-on Tools.

"It took a lot of effort for just a small little patch," Gray said, "but this is kind of a brand-new project, and we were figuring it out as we [went]."

The first challenge they faced was to level the uneven ridge of the deteriorating breakwater. The blocklike castles need to be set on a flat surface to fit together properly. So the researchers tried filling the gaps by emptying pails of crushed stone water over them. It worked, after a fashion, though the team is still mulling whether they need to anchor the

PA initiatives aim to re-embrace the Susquehanna River

Greenway projects deliver conservation, recreation, business opportunities

By Ad Crable

Back in the late 1990s, when the term “greenway” was fairly new, Pennsylvania environmental and transportation officials resolved to come up with a plan to create linked open spaces that were valued as vital contributions to the state’s ecological and human communities.

For land along the Susquehanna River, two large public-private greenway efforts emerged, aimed at protecting, revitalizing and promoting a 500-mile stretch of land and water trails, mostly along the river’s main and west branches. Revitalizing nearly 70 river towns forged during now-played-out industrial eras was another main goal.

The first initiative formally coalesced as the nonprofit Susquehanna Greenway Partnership in 2006.

A second, the Susquehanna Riverlands Conservation Landscape, grew to focus on the lowest reaches of the Susquehanna where, unlike most rivers, the waterway’s steepest fall occurs at the end of its journey. There, the river carved an impressive gorge through flanking forested hills with no room for roads at river’s edge.

Since 2008, the Riverlands group has concentrated on protecting this unique geology on both sides of the river and promoting sustainable tourism through recreation and the considerable cultural and historical gems in growing Lancaster and York counties.

This partnership of public officials and businesses from the two counties, along with the state and National Park Service, received a boost in 2019 when Congress designated the Susquehanna National Heritage Area as the nation’s 50th national heritage area. The area was already one of four visitor centers on the Captain John Smith Chesapeake National Historic Trail.

So far, 6,300 acres of wooded riversides have been protected, including 1,100 acres in York County just this year. Most of the preservation has come from the sale of utility lands to the Lancaster Conservancy, which then works to provide access to them.

“You have protected viewsheds, pristine streams and real access opportunities for everyone,” said Fritz Schroder of the conservancy.

The state Department of Conservation and Natural Resources has awarded millions of dollars in grants for land-preservation



Above: Cyclists enjoy the West Branch of the Susquehanna River. (Susquehanna Greenway Partnership)

Top left: The Lower Susquehanna Gorge is glimpsed from Chickies Rock in Lancaster County, PA. (Susquehanna National Heritage Area/Open.Tours)

Bottom left: A paddling demonstration takes place on the Lower Susquehanna River as part of a Susquehanna Riverlands Conservation Landscape event. (Susquehanna National Heritage Area)

projects through the years. Its secretary, Cindy Adams Dunn, said that initiatives along the Susquehanna are proof that “greenways are powerful tools to achieve sustainable growth and livable communities.”

Greenway Partnership

Although the greenway is not yet complete, the partnership has preserved large strips of the river corridor and helped to instill in its residents a new sense of river-bound pride, livability and accompanying ecotourism.

The partnership oversees the 240-mile West Branch Susquehanna River Water Trail and helps link and promote several hundred miles of land trails and parks in a narrow strip on both sides of the river. A rule of thumb is if you can see the river, you are in the Susquehanna Greenway.

To date, 16 river towns up and down the Susquehanna have formally joined the greenway partnership, meaning they have created planning groups that work on ways to connect residents and visitors with the river.

The signs of momentum are seen in both subtle and dramatic ways. For example, in March 2021, The Nature Conservancy announced the purchase of 1,200 acres where the Susquehanna cuts through Kittatinny Ridge, a well-known landmark only a short distance north of the state capital in Harrisburg. The preserve protects

the viewshed for hikers on the famed Appalachian Trail.

In a more subtle event in May 2022, hundreds of residents and volunteers from businesses in 12 river towns collected hundreds of tons of trash from the river, streams and parks as part of Susquehanna Greenway Cleanup Week. The number of participating towns doubled from the year before, when the cleanup was first launched.

“We are in our teen years,” said Corey Ellison, executive director of the Susquehanna Greenway Partnership. “What needs to happen is [that] we are all united under this vision of connected corridors. We all need to embrace the value of open space and quality of life.”

Susquehanna Riverlands

“We’re happy. Business is booming.”

That’s Leo Lutz, longtime mayor of Columbia Borough, a Susquehanna River town in Lancaster County that was once considered as a site for the nation’s capital. The town has mostly languished for the last century.

That began to change when the Columbia Crossing River Trails Center was built along the river in 2016. It serves as a starting point and information nexus for exploring several land and river trails, the national heritage designation and boat

tours that shuttle visitors between historical and recreational attractions on both sides of the river. Prompted in part by COVID-19 restlessness, more than 200,000 people came to the visitor center in 2021.

Lutz excitedly ticked off a list of new local assets: a paddling outfitter, a new café in the old rail station across from the trail center, antique shops, industrial buildings repurposed for apartments and an overall new vibe. All are the result, he said, of the Susquehanna Riverlands initiative.

“The work being done is second to none,” said DCNR’s Dunn. “There have been so many impressive projects that have expanded outdoor recreation opportunities, while also protecting the region’s rich historic and cultural resources. The result has been sustainable economic development and an incredible opportunity to connect visitors to nature in a meaningful and lasting way.”

Mark Platts, president of the Susquehanna National Heritage Area, used to worry that people who didn’t have a boat couldn’t get to the river easily. And aside from nice views, there wasn’t much to do.

But now, he said, “core groups have put the river on the map as a place you can spend time at and experience, not just look at. There is this energy and accessibility and variety of experiences that weren’t here 20 years ago.” ■

Deer caught in the crosshairs as their population grows

Herd reduction often depends on guns and arrows, but others seek nonlethal solutions

By Ad Crable

White-tailed deer, once nearly gone from Chesapeake Bay drainage states, are now so plentiful that they threaten landscape vegetation and human safety. As a result, they are increasingly in the crosshairs of rifle scopes.

Often reluctantly, dozens of communities and state and federal agencies, including the National Park Service, are hiring sharpshooters to reduce deer populations. Their calls to arms are invariably prompted by one or more of these concerns: overbrowsing in natural areas, which decimates native plant species and young trees; collisions between deer and vehicles; tick infestations (deer are the primary hosts of ticks that carry Lyme disease); and damage to gardens and landscaping.

Gettysburg National Military Park was the first national park to cull its deer herd. The park has been hiring sharpshooters since 1996 because the impacts of grazing deer were preventing the mandated preservation of historical woods and crop fields. A lawsuit by an animal rights group halted the program temporarily in 1997 but failed to end it.

After community officials or park managers decide that a deer population has to be thinned, with few exceptions the choice is to shoot the deer, rather than use more difficult and expensive methods that involve contraceptive drugs or surgical sterilization. The decision is almost always controversial.

Game managers in Pennsylvania and Virginia generally consider contraceptives and sterilization to be unfeasible and too expensive, much to the chagrin of animal rights groups. Virginia and Maryland, though, have allowed several small projects for research purposes. Phoenix, MD, a small community north of Baltimore, is the only place where a nonhunting general permit has been given to reduce deer through surgical sterilization.

“Research has shown nonlethal methods are limited in applicability, prohibitively expensive [and] logistically impractical,” said Katie Martin, a deer, bear and turkey biologist for the Virginia Department of Wildlife Resources. “In our experience, hunting and sharpshooting have been the only practical means available for deer management in urban areas with high deer populations.”



White-tailed deer graze on an athletic field in Maryland. (Will Parson/Chesapeake Bay Program)

In most cases, trained sharpshooters have been the preferred choice to bring down deer numbers in Bay states. But many state game and wildlife agencies would rather see hunters, with increasing help from bow hunters, perform the service.

The states’ game managers say recruiting new recreational deer hunters in great numbers is not a realistic option, so they have focused on modifying bow-hunting rules — reducing standoff zones in some populated areas — to help reduce the herds. Maryland’s management plan for 2020–34 allows bow hunting in some counties within 50 or 100 yards of occupied buildings, down from the previous 150-yard safety zone. The Pennsylvania Game Commission allows landowners to waive the state’s 50-yard safety zone for archery, and those who allow their land to be used for deer management are protected from liability.

Virginia created new safety rules 20 years ago, allowing archers to hunt deer in populated areas if they’re doing so to control the herd. Since then, 56 communities have held such “suburban” hunts.

Fairfax County, VA, has embraced bow hunting as its preferred way to reduce deer numbers. Last fall, bow hunters were permitted in 103 county parks, taking 823 deer. In 11 other parks, police sharpshooters assisted and killed 56 deer.

Botanists are seeing rare plant species rebound, according to Katherine Edwards, a wildlife management specialist for the county. Vehicle collisions with deer are



A tranquilized female deer undergoes surgical sterilization in a makeshift surgery center in a garage in Phoenix, MD, while two more await their turn. (Enid Feinberg)

on the decline. In the last four years, the culling of 1,642 deer has generated nearly 50,000 pounds of venison for food banks and the Hunters for the Hungry program.

The sharpshooter solution

Nighttime sharpshooters have helped bring down deer numbers in dozens of communities in Bay watershed states, such as Fairfax County and Charlottesville in Virginia, and Montgomery and Howard counties in Maryland. Fairfax County and Charlottesville use a combination of hunters and sharpshooters to trim the herd.

Many national parks in the region, which are prohibited from allowing hunting, also have resorted to nighttime sharpshooters. Among them: Catocin Mountain Park, Antietam and Monocacy national battlefield parks and Chesapeake & Ohio Canal in Maryland; Manassas National Battlefield Park in Virginia; Gettysburg National Military Park, John Heinz National

Wildlife Refuge and Valley Forge National Historical Park in Pennsylvania; and Harpers Ferry National Historical Park in West Virginia.

Federal properties in the District of Columbia and surrounding suburbs have also used lethal means to keep deer from denuding the landscape and reduce crashes with vehicles. Included are the Goddard Space Flight Center, Randall Cliffs Naval Research Lab, National Agricultural Research Center, National Arboretum, National Zoo and Rock Creek Park.

The hard truth, many wildlife officials and game managers say, is that humans have only themselves to blame for needing these unpopular lethal control methods. That’s because residential areas, farms and fields are vastly better habitat for deer than wilderness.

“Deer are attracted to suburbs for the same reason as people,” notes the Pennsylvania Game Commission’s *A Guide to Community Deer Management in Pennsylvania*. “There are natural areas, greenways, parks that provide bedding areas, escape cover and birth sites. Homes are landscaped with trees, shrubs and herbaceous cover, which are appetizing and nutritious to deer. [And] predators have been extirpated or controlled. These conditions lead to high reproductive rates, low mortality rates and small home ranges for deer.”

Under these ideal conditions, female deer as young as 6 months may begin breeding, and some will produce triplets instead of the twins typical among forest deer.

In the early 1900s, deer were scarce in the Chesapeake watershed. Their habitat had been diminished by mass timbering and their numbers greatly reduced by unregulated market hunting. But deer have come roaring back, thanks to reintroduction programs and accommodating suburbs.

Pennsylvania’s deer population is estimated at 1.5 million, with approximately 50,000 deer-vehicle collisions each year — among the most in the nation. Virginia has between 850,000 and 1 million deer, and Maryland has an estimated 220,000.

A case in point on Rock Creek

A prime example of the problems caused by the overlapping of deer and human populations and the thorny dilemma that follows is embodied in DC’s Rock Creek Park.

At 1,754 acres, it’s one of the largest swaths of urban green space in the country,



Deer stroll across a street on the campus of the National Institutes of Health in Bethesda, MD. (National Institutes of Health)

with ravines, rolling hills, mature forests and miles of trails that bisect the northern corner of the city. The park also sees considerable vehicle traffic, and collisions with deer are common.

Until 1960, no deer had been reported in the park. By 2012, there were typically more than 100 deer per square mile — about five times the limit scientists have pegged for native plants to survive and seedlings to grow into trees.

Deciding that deer number had to be reduced, the National Park Service conducted extensive explorations of lethal and nonlethal options. It ruled out nonlethal options because the herd needed to be thinned promptly and there were “no reports of vegetation recovery where [nonlethal methods were] being used,” said Megan Nortrup, an NPS spokeswoman for natural and cultural resources.

Using firearms experts from the U.S. Department of Agriculture’s Wildlife Services, which is responsible for reducing wildlife conflicts, the first Rock Creek cull took place in 2013. Once each year, the park is closed overnight to everyone except permitted shooters fitted with night vision goggles, silencers and heat-seeking sensors to locate deer in the dark. Sometimes they use bait to concentrate the deer.

The hunts have been unpopular, and protests are so common that the park has a designated “First Amendment area” for gatherings. The group In Defense of Animals, which once sued to stop the hunt, describes the killing of “gentle ungulates” as unnecessary and says Rock Creek Park

has been turned into “killing fields.”

“Our urban deer are now essentially war refugees seeking a place they perceive to be safe to raise their families and live their lives,” the group said.

But NPS officials, who say 505 deer have been killed, say the program has revived plant life in the park. The density of native tree seedlings has almost tripled.

Roughly 17,000 pounds of venison from culled deer have been donated to DC Central Kitchen, an award-winning nonprofit that provides healthy food to the low-income people, as well as offering culinary job training.

Since fall 2020, deer culls with sharpshooters have been added to 27 other park service units in the DC area. The sites range in size from 18 to 187 acres.

The NPS points to even greater recovery of seedling growth in other national parks under deer-reduction programs. At Catoctin Mountain Park in Maryland, 1,489 deer have been shot since 2010 and seedling density has increased 13-fold.

The argument for co-existence

Animal rights groups and others think people are being selfish when they push deer out of their native grounds, only to kill them when they are perceived as a nuisance elsewhere.

“We are so quick as a species to choose vigilantes,” said Cynthia Fain of Culpeper, VA, an activist who fought lethal deer controls in Charlottesville.

People should try to co-exist with deer, she said, by fencing in gardens, landscaping



A white-tailed deer visits Antietam National Battlefield in Sharpsburg, MD, site of a major battle during the Civil War. (Will Parson/Chesapeake Bay Program)

with plants that don’t entice deer, keeping watch for deer crossing roads, and wearing protective clothing to avoid tick bites. When deer herds need trimming, it should be done with nonlethal fertility controls, she said.

Johanna Hamburger of the Animal Welfare Institute thinks the NPS has gone down the wrong path by killing deer. She maintains that invasive plant species, not deer, are the main cause of declining native vegetation in Rock Creek Park.

“NPS is looking for an easy way out,” she said, “and that’s to blame deer. It’s harder to take a more holistic approach and deal with things that are harder. . . . The responsibility for us is to adapt our lifestyles to live in harmony with wildlife.”

Nonlethal approaches such as contraceptive drugs and surgical sterilization, she added, have proven to be effective in many places if given time.

As proof that nonlethal means can work, The Humane Society of the United States cites its 27-year effort to bring down the deer population with the contraceptive PZP. The drug is injected into captured deer at the National Institute of Standards and Technology’s fenced, square-mile office complex in Gaithersburg, MD. More recently, deer there also have been captured and surgically sterilized.

Deer densities and deer-vehicle accidents have both decreased from these methods. But wildlife agencies remain doubtful. Immigrating deer will eventually offset progress, they say, and the contraceptive needs to be administered repeatedly.

Another well-publicized nonlethal experiment is the sterilization of deer at the National Institutes of Health in Bethesda, MD, since 2014. Female deer are captured for surgery using tranquilizer darts.

The deer population has declined 70%, and the population has been stable since 2016. But critics note that the density is still high and incoming deer have prevented further decreases.

Among Maryland, Pennsylvania and Virginia, the only place given free rein — other than for research — to manage deer with birth control is Phoenix, MD, an unincorporated exurban community of about 7,400 people approximately 20 miles north of Baltimore.

There, since 2015, Enid Feinberg, president of the nonprofit group Wildlife Rescue Inc., has headed periodic sterilization operations. Volunteers “hunt” female deer in the area with tranquilizer guns, then take them to a makeshift surgery center in Feinberg’s garage. There, volunteer veterinarians perform the 20-minute operation that renders female deer infertile.

The surgery doesn’t just limit deer population. Feinberg said it also changes some of their problematic behavior. “If they are not pregnant, does eat much less,” she said, meaning less damage to people’s gardens and landscapes. “And since they don’t go into heat, they’re not being chased by bucks and there are less deer-vehicle collisions.”

Over 11 years, the group has spayed 110 deer. “It’s absolutely the most humane way,” she said. ■

Navy golf course draws fire from locals, environmentalists

Federal exemption from critical area protections called into question

By Jeremy Cox

Sue Steinbrook lived in Annapolis within a few miles of the Greenbury Point Conservation Area for more than a decade without ever visiting the woody oasis. But during the early days of the COVID-19 pandemic in 2020, she ran out of excuses not to drop by.

“It’s a hidden gem,” said Steinbrook, an account manager for a local general contractor. “The first thing I wanted do was [show my son] this amazing place.”

Now, she finds herself on the front lines of a battle to save the 230-acre peninsula from a developer accustomed to getting its way: the U.S. Naval Academy.

The Navy publicly acknowledged in April that it is considering a request from the Naval Academy Golf Association to lease land at Greenbury Point to build a second golf course, adjacent to the 18-hole course that has served the storied institution since 1940. Like the existing course, it would be open only to midshipmen, USNA faculty and staff, active and retired military and civilian members.

The project, critics say, would destroy important animal and bird habitat, add more nutrient pollution to the already beleaguered Chesapeake Bay and eliminate a beloved slice of publicly accessible nature.

Alarmed, Steinbrook co-founded a Facebook group called Save Greenbury Point, which has accumulated 1,700 followers since its launch in early May. Each day brings a fresh batch of wildlife photos, words of encouragement and morsels of information about the project.

The outcry quickly spread to the region’s formal environmental groups. The Severn River Association and the Chesapeake Conservancy sponsored an online petition that by late June had collected more than 3,000 signatures. The two organizations also bankrolled a statewide poll, which showed that 67% of respondents oppose the golf course, with only 13% in support.

Anne Arundel County Executive Stuart Pittman initially told nearby residents that he would be willing to tie himself to a tree to stop the project. He has since clarified that he was “figuratively speaking,” but his concerns remain deep.



Sue Steinbrook talks with Jim Roser, from Crofton, MD, who likes to walk the trails at Greenbury Point near Annapolis. (Dave Harp)

“My advice to [the Naval Academy] is to listen, engage and work with the community,” Pittman said.

The project’s location, though, presents a complication. The golf course is proposed on land owned by the Navy — a branch of the Department of Defense and as such not governed by county zoning rules or, in many cases, state environmental laws. As a result, opponents don’t have access to many of the usual levers of democracy.

“If this was being done at the county or state level or even another federal agency,” said Joel Dunn, the Conservancy’s

president and CEO, “there is a process that would require open public comment and engagement, and that hasn’t happened here.”

Steinbrook and her environmental allies therefore are pinning their hopes of stopping the project on a patchwork of federal environmental laws and regulations. She, for one, is confident that opponents can make a strong argument against allowing the project to go forward.

“It’s wrong for so many reasons,” Steinbrook said. “To monetize [the property] would be an environmental sin.”



The east shore of Greenbury Point offers views of Whitehall Bay. (Susan Mays)

Enjoyed by ‘all walks of life’

Greenbury Point juts into the Chesapeake Bay on the north side of the mouth of the Severn River. The land is owned by the Navy as part of the Naval Support Activity Annapolis facility.

Some activists ground their arguments for the land’s salvation in its seminal role in Maryland’s history. In 1649, Puritans expelled from Virginia founded a settlement on what is now called Greenbury Point. Over the next few decades, the hamlet outgrew the peninsula’s modest acreage, spilling across the river into what would become the state capital: Annapolis.

By the 1700s, the point had been converted into farmland. The Naval Academy purchased the site in 1910 and temporarily used it as a dairy farm. But for most of the 1900s, the peninsula was occupied by nearly two dozen tall radio towers used for communications research and transmitting messages to Naval vessels in the Atlantic and the Mediterranean Sea.

All but three of the 19 towers were demolished in 1999. The surviving towers structures continue to serve as a navigation aid, visible for miles, for Bay boaters. The property at the tip of the peninsula remains in use as an occasional training ground for midshipmen and as a buffer for a firing range.

Despite years of human activity, nature is returning to Greenbury Point, advocates say. Dotted the landscape are pockets of trees — a mix of loblolly pine, American elm, tulip tree, chestnut oak and mulberry, among other species. Dozens of bird species have been spotted there as well, including bald eagles and ospreys.

When not in use by the Navy, the point is open to recreation. Since 2000, the Navy has operated a 2,400-square-foot nature center on the property and maintained about 2 miles of walking trails. Bird watchers, runners, walkers and anglers are among those who find the area inviting, said Jesse Iliff, executive director of the Severn River Association.

“Right now, Greenbury Point is used by people from all walks of life,” he said. “The notion that some elite, nondisclosed group of people is pushing to take a resource from the community really sticks in my craw.”

High demand for golf at academy

Rumors of the golf course proposal began trickling into the surrounding residential areas earlier this year. Navy officials had scheduled at least one informal community meeting but canceled it after



The existing Naval Academy golf course on Greenbury Point has been available to academy staff, visitors and midshipmen since its construction in 1940. (Dave Harp)

the plans started kindling an uproar.

Calls for the Navy to turn over proposal documents have become a battle cry among opponents. The Navy's response — that there are no plans to share because the proposal hasn't advanced to that stage yet — has been met with skepticism.

Ed Zeigler, director of public affairs for Naval District Washington, characterized the plans as a "proposed concept." In a written statement to the *Bay Journal*, he added that "If the proposed project moves through the review process, transparency, community involvement and input will be critical to meeting the needs of the Navy and the Annapolis community."

Chet Gladchuk, the athletic director for the Naval Academy, also insisted that no detailed plans have been drawn up. "The Navy has not extended permission to move forward with any concept development at this time," he wrote in an email. "Therefore, I have nothing formal on the matter. At this time, everything is purely conceptual. Glad to talk to you if and when we have something to share."

Gladchuk didn't reply to a follow-up question asking why the academy is pursuing a second golf course.

The current Naval Academy golf course is widely acclaimed as a premier facility, a sterling example of the work of the famed early 1900s course architect William Flynn. In 2020, the academy completed a \$6 million renovation of the course, refurbishing the greens, bunkers and fairways while installing a new irrigation system.

According to the course's website, more

than 480 golfers are signed up as members, and no new members are being accepted. To add more, the site asserts, would put the facility over capacity and potentially degrade the experience for existing members. In a February letter, Gladchuk told Navy officials in Washington that mitigation efforts would include building a public walking trail, installing a berm to protect "sensitive hazardous material," and offsetting the losses of trees and conservation land.

Environmental assets in the way

Little may be publicly known about the proposed golf course. But what is known about Greenbury Point suggests that a normal golf course developer would have to leap over several environmental hurdles to build a course there.



A turtle tucks into its shell near the foot of one of the three surviving military radio towers at the south end of Greenbury Point. (Steinbrook Photography)

One of the most formidable obstacles would be the state's Critical Area Act. The law, passed in 1984, limits development within 1,000 feet of tidal waters and largely prohibits any disturbance of land or vegetation within 100 feet of the water.

Greenbury Point is almost entirely inside the critical area. Legal experts say it is unlikely that the project would be subject to that environmental law because it is enforced at the state level — and federal land is generally exempted from lower regulatory edicts.

On the other hand, if the new course disturbs wetlands or waterways — an analysis conducted by the Chesapeake Conservancy suggests that half of the 230-acre property qualifies — the project will likely need to secure permits from the state, experts say. That authority is delegated from the federal government.

The property's forest cover could also pose an obstacle. Zeigler confirmed that the Greenbury Point has been the focus of years of tree plantings and off-site mitigation required for other Navy projects in the region.

Environmentalists say that removing any of those trees would dismantle the military branch's earlier environmental commitments and deliver a blow to the Chesapeake Bay restoration effort. The Department of Defense was the first federal agency to formally sign on to the multi-state and federal cleanup pact.

"Part of the Bay Agreement was they agreed to protect and maintain forest cover," said Josh Kurtz, head of the Chesapeake Bay Foundation's Maryland office. "And we see this as an important place for meeting those requirements."

Despite its green vistas, Kurtz said, a golf course would be a particularly unwelcome addition to the Bay's shoreline.

"When you're building a golf course, you need pesticides and fertilizer," he said. "When you design a golf course, you need to move water off the site as quickly as possible, and that means into the Severn River and Chesapeake Bay. So, we're going to see increased pollution loads because of it."

Federal help

Opponents point to a constellation of federal environmental laws and commitments they can wield against the project:

- The National Environmental Policy Act (NEPA), which requires federal agencies to review the environmental impacts of their proposed actions before implementing them.
- The Sikes Act, which directs the Department of Defense to protect and enhance natural resources on military land. Crucially,



Visitors travel a portion of the roughly 1.5 miles of trails on the U.S. Navy-owned property. (Joel Dunn/Chesapeake Conservancy)

military leaders must coordinate with state and federal fish and wildlife agencies to lay out their conservation goals in planning documents, called Integrated Natural Resource Management Plans.

■ The 2014 *Chesapeake Bay Watershed Agreement*, which sets goals for restoring natural resources in the Bay itself and around its 64,000-square-mile drainage basin. The Greenbury project, critics say, could conflict with the goals to expand forest cover and reduce nutrient inputs.

"If we can't beat this back," said Iliff of the Severn River Association, "we're not doing our jobs."

But in previous projects, the Naval Academy has faced little friction from such regulations. During the recent golf course renovation and a separate project to build guest cottages about half a mile south of the course, for instance, the Navy was allowed to bypass requirements for an environmental assessment and public comment.

As reported by Annapolis-based reporter Donna Cole, the military branch received what is called a "categorical exclusion" under NEPA — a finding reserved for projects believed to pose little or no effect on the environment.

Steinbrook said the meteoric growth of her Facebook group shows how strongly the community opposes the project. At the very least, she said, she wants the Navy to follow through on its vows to be transparent about its plans and provide opportunities for meaningful public input.

"It is protected under the Sikes Act, and you can't just turn your head," she said. "It will be interesting to see how they try to get around that." ■

Sewage treatment woes drag on at Baltimore plants

Blue Water Baltimore, city spar in court while Back River residents fume over bacteria warnings

By Timothy B. Wheeler

A year after Maryland inspectors found numerous pollution violations at Baltimore's two wastewater treatment plants, they are still not in compliance with their discharge permits, according to state reports. Despite "measured progress" reported at the larger of the two, which discharges to Back River, it remains unclear how long it will take to remedy serious disrepair at both facilities.

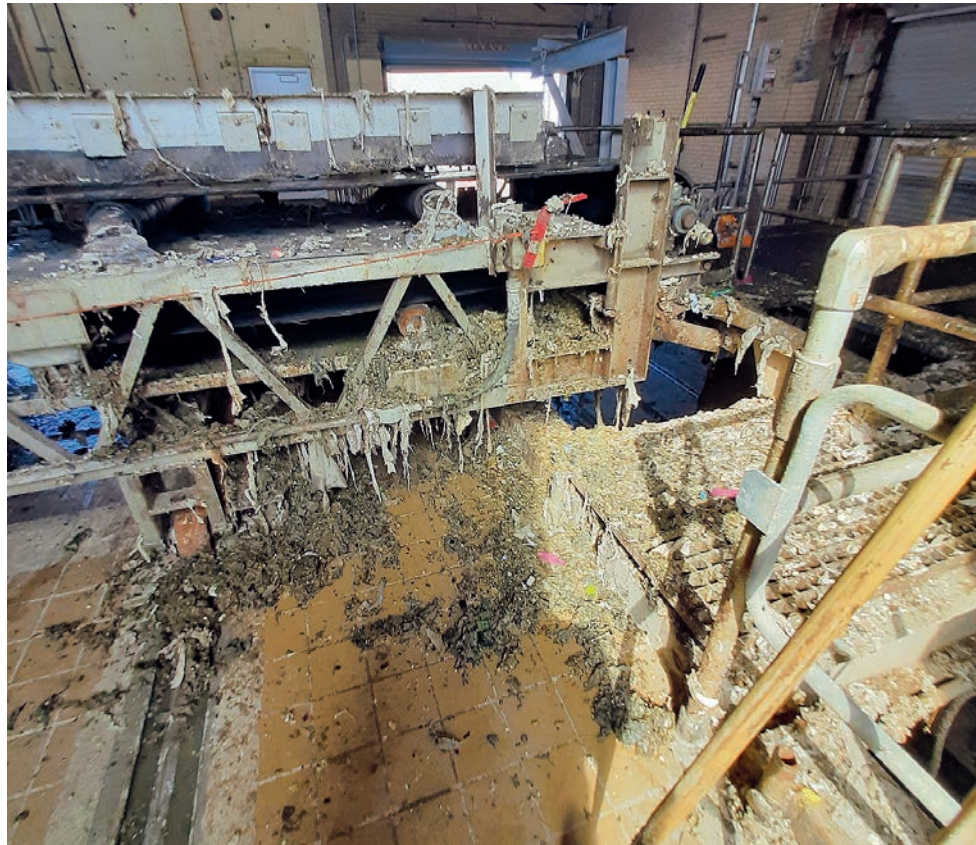
That frustrates residents living along or recreating on Back River, who are on edge over water samples periodically showing unsafe levels of bacteria. It has also prompted Blue Water Baltimore, a local watershed watchdog group, to seek a federal court injunction requiring immediate improvements at both wastewater facilities.

"Time and time again the city has failed to act," said Angela Haren, senior attorney with the Chesapeake Legal Alliance, which is representing Blue Water Baltimore. In announcing the court action, she called it an emergency, saying, "The illegal discharges are putting public and environmental health in danger."

The two city-owned wastewater plants are the largest in Maryland. The one discharging to Back River treats about 145 million gallons of wastewater daily from the city and Baltimore County, while the other discharges about 65 million gallons daily to the Patapsco River in Baltimore's outer harbor. Both were upgraded in recent years at a cost of more than \$1 billion to enhance removal of nutrient pollution.

Blue Water Baltimore's legal move followed the release in early June of a damning report finding "a systemwide catastrophic failure to operate and maintain [the Back River plant] at every level." The report was produced by the Maryland Environmental Service, a quasi-public engineering agency that the Maryland Department of the Environment sent to oversee the plant. MDE had taken that unprecedented step in late March after its own inspection found "ongoing and escalating problems" there.

MES found much equipment in need of repair or replacement throughout the plant, resulting in partially untreated sewage being discharged into Back River. In addition to generally poor housekeeping and unaddressed safety hazards, MES also observed



A state inspector noted "housekeeping problems" at Baltimore's Patapsco Wastewater Treatment Plant. Here, trash and debris had fallen off a conveyor belt designed to carry away solids filtered from incoming sewage. (Maryland Department of the Environment)

plant workers sleeping or washing cars on the job and fighting among themselves. The report cited a "lack of responsiveness" by city managers, including the failure of the city's public works director to attend meetings about the problems.

Shortly after the report's release, city officials dropped a lawsuit they had filed opposing MDE's takeover of the Back River plant. They signed a consent order agreeing to cooperate with MES engineers.

There is no such agreement covering the Patapsco wastewater plant, which has some of the same problems and extensive pollution violations. MDE officials said they are in talks with the city and hope to iron out a consent order for that facility soon.

Blue Water Baltimore nevertheless asked a U.S. District Court judge to order corrective actions. The MDE consent order only covers the Back River plant, and MDE's own reports show the city has ignored state cleanup orders before, Haren said.

The city filed a response arguing that judicial action was unnecessary and unwarranted given state enforcement action

taken. A hearing is scheduled July 20.

The city's sewage treatment woes are not just a local problem. Activists say they're a byproduct of a general environmental enforcement breakdown in Maryland.

The Chesapeake Accountability Project, a collaboration of four environmental groups, reported earlier this year that MDE conducted 39% fewer water-related inspections and took 67% fewer actions for water pollution violations under the Hogan administration than in the preceding six-year period. Lawmakers have passed a new state law requiring MDE to increase staff and inspections and levy more penalties for violations.

The wastewater plants' dysfunction has also dealt a setback to efforts to restore the Chesapeake Bay's water quality. Data released in June by the federal-state Chesapeake Bay Program showed that in 2021, the plants' treatment failures increased nitrogen pollution into Maryland waters by 2.5 million pounds.

In late June, MDE reported "measured progress" in fixing the Back River plant's

treatment problems resulting in "significant improvements" in reducing discharges of nutrient and sediment pollution.

But on the eve of the July 4 holiday weekend, the Baltimore County health department issued a water quality advisory warning residents to "take precautions" around Back River after high levels of bacteria were detected in the water, including near the wastewater plant outfall.

The county and MDE have been checking Back River water since April after Blue Water Baltimore reported its sampling detected high bacteria levels there and residents complained of discolored water and brownish clumps near the outfall. The watershed group had also prodded MDE a year ago to inspect the city plants after detecting high bacteria levels by the Patapsco facility's outfall across the river from the Dundalk marine terminals.

MDE has a notice on its website urging residents to take precautions, but signage along the river with similar messages has been on and off. The county posted a warning at Cox's Point Park, just across the river from the wastewater plant in April but removed it after subsequent testing found lower bacteria levels. There have been other bacteria spikes detected since, but MDE and county officials have attributed those to heavy rains rather than sewage plant malfunctions.

Officials don't know why bacteria counts in the river soared just before the holiday weekend, said David Lykens, county director of environmental protection and sustainability. There had been no rainfall beforehand, but the sampling team had noticed "some discoloration in the water," he said. Levels were "good" again the following week, he said in an email.

Desiree Greaver, project manager for the Back River Restoration Committee, a local nonprofit, said residents remain confused and concerned by the inconsistent and sometimes conflicting water sample results. Her group and Blue Water Baltimore both have called for signs to be posted for the time being along the river advising residents to take precautions.

"Whether the bacteria is [coming from] the treatment plant or it's coming from somewhere else," Greaver said, "we deserve the right to know there's a potential risk when we come into contact with this water," she said. ■

Invasive spotted lanternflies may be 'here to stay'

Insect spoils crops as researchers seek new tools for the fight

By Jeremy Cox

Despite quarantines, public squashing campaigns and federally subsidized bug-spraying blitzes, the spotted lanternfly continues its stubborn game of hopscotch across the Mid-Atlantic region.

Pennsylvania added 11 counties to its quarantine zone earlier this year, raising the total to 45. Maryland designated nine new counties, bringing its number to 11. And in Virginia, agriculture officials announced a new detection in Prince William County but declined to include the county among the state's four quarantined jurisdictions.

Experts suspect lanternflies arrived in the United States in 2014 in Berks County, PA, aboard a shipment of stone from China. Since then, the winged pests have invaded 11 states, mostly in the Mid-Atlantic and Midwest. They have been reported in every Chesapeake Bay watershed state but not the District of Columbia.

The lanternfly's latest push into new territory increases the already long odds of expelling the invasive species. And it serves up more support for an emerging scientific consensus that the pretty, but destructive, bugs are winning the battle.

"There's a lot of research being done on spotted lanternfly, and I don't think any [of the results are] positive," said David Gianino, who oversees the plant industry division of the Virginia Department of Agriculture and Consumer Services.

"We can't eradicate it at this point," he added. "It's here to stay. All we can do at this point is to slow its spread."

Why keep up the fight? The typical response is that there are simply too many livelihoods at stake.

In their adult form, the bugs typically measure an inch long by a half-inch wide, with large, colorful, spotted wings that give them their name. The front set is usually beige with black dots. The back wings are two-tone: a bottom of scarlet with black spots and a top of black and white stripes.

Lanternflies feast on an estimated 70 types of plants and crops, including apples, peaches, oaks and pines. And they are unkind to alcohol lovers: Hops and grapes are among their dining options. In the early days of the infestation in Berks County,



Secretary Russell Redding of the Pennsylvania Department of Agriculture (left) joins agency specialists Zachary Hetrick and Jennifer Barckhoff as they work to control spotted lanternflies. (Courtesy of the Pennsylvania Department of Agriculture)



Left: An adult spotted lanternfly photographed in Pennsylvania in October 2018. (Caitlyn Johnstone/Chesapeake Bay Program) Right: An adult spotted lanternfly (top) and a late-stage nymph photographed in Pennsylvania in July 2018. (Stephen Ausmus/U.S. Department of Agriculture)



some wine vineyards lost almost all of their crop to the voracious bugs.

"While they are not known to pose any serious human or animal health concern, the spotted lanternfly is a destructive invasive species that has negatively impacted agriculture operations throughout the Mid-Atlantic region," said Maryland Department of Agriculture Secretary Joe Bartenfelder. "MDA has taken steps to expand the quarantine zone out of an abundance of caution as we remain vigilant in controlling the spread of this destructive insect."

One of the biggest challenges with controlling the spread is that lanternflies tend to move into new areas by hitchhiking in cargo or on the sides of vehicles, with anyone's guess where they might pop up next.

The quarantines restrict the movement of items that might contain the spotted lanternfly in any of its life stages, including egg masses, nymphs and adults. Examples include plants, construction waste, firewood, packing materials and vehicles. Businesses, municipalities and government agencies that require the movement of such items must obtain a specialized permit.

Officials in many states have turned to the public for support, hoping to build a volunteer army of lanternfly squashers. A sampling of recent news headlines reflects the increasingly dire tone of the crusade: *Die, beautiful spotted lanternfly, die; See a spotted lanternfly? Squash it, officials say; For states dealing with the spotted lanternfly, the policy is 'no mercy'; and Stomp them out!*

Another problem: The lanternfly's diet is so varied that it's almost impossible to put a dent in their numbers by removing their sources of food, said Shannon Powers, a spokeswoman for the Pennsylvania Department of Agriculture.

"Is it realistic to think they'll be eradicated? We don't know," Powers said.

Scientists are coming to a similar conclusion. A Purdue University study, for instance, that was published last December attempted to quantify the rate of spread. Researchers estimated that the infestation has been spreading at a rate of about 25 miles per year, in all directions, and they concluded that the best states can do is to slow the pace.

"Based on the results presented here, we anticipate that spotted lanternflies will continue to spread in the USA, though management and eradication efforts may effectively reduce population densities, reproductive potential and ultimately rate of spread," they wrote.

In Virginia, lanternflies have been largely relegated to the state's northern tip, and Gianino wants to keep it that way. The state is looking to receive \$750,000 in USDA funding this coming year, a \$40,000 bump over the current year, to continue the fight.

"For us, by taking some action to control its spread, we are protecting the industries that are the greatest risk in Virginia," Gianino said.

But obstacles abound. Last year, he and his colleagues observed the biggest jump to date in localities with detections. He blames the uptick on an increase in traveling as coronavirus restrictions began to lift.

But commerce probably also played a role, he added. The economic slowdown during the height of the pandemic left many shipping containers sitting around, giving lanternflies plenty of time to slather them with egg masses, Gianino said. Once those containers got moving again, the insects rode along into new domains.

Lanternflies are slipperier than most pests, Gianino explained. So far, no one has been able to find or develop a chemical to lure them to a trap. And they appear to have no natural predators. The way he sees it, efforts to suppress the spread will buy time for researchers to develop better tools for the fight.

"We're putting out some small fires when it comes to this pest," he said, "but we don't have any silver bullets yet." ■



Bring a bicycle or paddle to experience the wilderness of PA's Grand Canyon

By Ad Crable

David Conard of Asheville, NC, stood next to his bike in a grassy area carved from the base of a steep mountainside along gently flowing Pine Creek. His stop was near the midway point of the breathtaking Grand Canyon — in Pennsylvania, not Arizona.

Rippling past picnic tables and primitive campsites at this spot along the 62-mile Pine Creek Rail Trail, the eponymous creek (one of the largest “creeks” in the nation) sparkled in sunshine. A Baltimore oriole flitted in the overhanging trees and, as if choreographed, a mature bald eagle winged by.

“The peaceful beauty of it — you will not find that long a stretch on any rail trail that I know about,” said Conard, a retired physician.

The tranquility at the ghost town of Tiadaghton, in the heart of the Grand Canyon, stands in stark contrast to the late 1800s, when this booming lumber and logging center boasted a sawmill, hotel, post office, two general stores and more

than 20 homes. Except for a handful of structures that survive as camps, it's gone.

The latest transformation of Pine Creek Valley in the Allegheny Mountains thrives on recreation, not lumber. The nearly flat rail trail — never more than a 1% grade — parallels Pine Creek all the way to the West Branch of the Susquehanna River, and it has been called one of the best in the nation.

State recreation officials envisioned that possibility in 1988, when the New York Central Railroad abandoned the freight and passenger line that had operated here since 1884. The railbed follows what was once a Seneca path through the mountains.

After overcoming some wary pushback, the first section of the Pine Creek Rail Trail opened in 1996. Sections were added until 2006, and expansions at both termini are in the works.

The trail has become a hiking and biking destination for all ages with its pressed limestone surface, ample shade, spaced restrooms and a route that traces the creek. Mountains loom up

to 1,500 feet on both sides of the trail.

The 18-mile gorge at Pine Creek's rugged northern end has been dubbed the Pennsylvania Grand Canyon. It's almost completely roadless, meaning you must go on foot, bike, kayak, canoe or horse to enjoy its beauty and solitude. It was designated a National Natural Landmark in 1998.

“Besides the beauty itself, you have the lack of access, so it's mostly people that access it by primitive means. It's just a nice, quiet way to be away,” said Chuck Dillon, who founded Pine Creek Outfitters in 1984 and has written hiking and history guides of the region.

With ample equipment rentals and shuttles available, the entire length of Pine Creek is a destination for whitewater paddling and rafting in the spring, and, when water levels ebb, leisurely floats in canoes, kayaks, tubes and stand-up paddleboards.

Riding or drifting amid birdsong and the gentle murmurings of the creek, it's hard to imagine how different the area once was.

Photo: Bicyclists follow Pine Creek on the 62-mile Pine Creek Rail Trail in the Allegheny Mountains of Pennsylvania. (Ad Crable)



An old milepost along the Pine Creek Rail Trail is a reminder that the route once carried a busy railroad serving the area's lumber industry. (Ad Crable)

In the early 1800s, log rafts were the mode of lumber transport downstream. By 1845, 145 sawmills had been built along the creek's banks. Splash dams released water in surges that sent rafts of massive white pine and hemlock logs downstream. The last log drive was in 1909.

In Baltimore shipyards, the pines were turned into sturdy ship masts and beams. The hemlocks were used as lower-quality lumber and a source of tannic acid for tanning hides.

Later, with the building of the railroad, specially made Shay and Climax locomotives huffed and puffed on steep narrow-gauge railroads to get felled trees to the creek bottom. Black powder explosions echoed off the canyon walls during the construction of temporary switchback rail lines to haul trees down to the main track.

These days, the loudest sounds you are likely to encounter are the muted crunch of bike tires on gravel and the excited shrieks of rafters splashing through rapids.

But reminders of the railroad era remain. Many of the stream crossings are repurposed train bridges, and a few of the tombstone-like mile markers still stand trailside.

Eventually, the mountainsides were stripped bare of trees. The sawmills and tanneries closed and towns such as Waterville, Cammal, Slate Run, Cedar Run and Blackwell emptied out. Today, the remnants of those towns provide ice cream stops, inns and rental cabins.

Logging debris, known as slash, was prone to catching fire, and in many places nothing but ash and bare soil remained after the trees were harvested. Silt from bare hillsides clogged the native trout streams, and wildlife paid the price.

Later, coal brought another industrial boom. Acid drainage from coal mining still taints a few streams in the area, though they are slowly being treated.



Summer paddlers float by Rattlesnake Rock, a landmark on scenic Pine Creek. (Ad Crable)

Pine Creek Valley, broadly speaking, remains a place of few roads and human intrusions, in part because much of the bordering land is part of state forests, parks and game lands.

Whether you journey by foot, bike or on the water, Pine Creek sports an impressive array of sights and history. You'll find waterfalls dripping with coolness and ferns just a short hike up many side streams.

One of the most popular side trips is the Turkey Path, a steep, 1-mile climb (with several stairways, so not for bicyclists) on a trail that sidles past waterfalls on the way to the summit in Leonard Harrison State Park. There, to reward the effort, is a stunning vista of the canyon and the ribbon of Pine Creek cleaving the mountains.

Geologists say that Pine Creek used to flow north but reversed itself 15,000–18,000 years ago after a glacier caused a lake to form, and erosion created a new overflow channel.

Landmarks along Pine Creek are steeped in more recent history. Barbour Rocks, a prominent outcropping, is named after a logger who died in the late 1800s while clearing a logjam in the creek. Deadman Hollow is named for a trapper who disappeared and was later found caught in one of his own bear traps.



A family bicycling the Pine Creek Rail Trail stops to explore one of many nearby waterfalls. (Ad Crable)



Pine Creek clefs the Allegheny Mountains in the 18-mile Pine Creek Gorge, also known as the Grand Canyon of Pennsylvania. (Ad Crable)

One of the few dwellings found in the canyon is a stone cabin along Four Mile Run that Teddy Roosevelt visited multiple times to fish for trout.

The nearby Algerine Natural Area is a wetland where log pirates, known as Algerines, would collect errant logs from drives and whisk them away.

Tom Boyer, a 71-year-old Ohioan who had brought seven other bicyclists to the trail, was reassuring them that the route would indeed be a piece of cake. "Every time I bring friends here they look at the mountains and question whether it's going to be flat," he laughed.

For Claudine Gartenberg of Philadelphia and her 10-year-old son Yoni, their first visit was by happenstance after a planned camping trip was washed out. They rented bikes and were having a blast using a phone app to identify birds by their calls.

"It's not busy," enthused Claudine as she marveled at a picturesque waterfall, "and it's gorgeous. It's like a perfect rail trail." ■

If you go

- The 62-mile Pine Creek Rail Trail offers year-round activities for visitors. It's accessible by car from many spots, except in the gorge known as the state's Grand Canyon, which must be traveled mostly by foot, bike or on the water. Bathrooms and rest benches are located about every 5 miles. Horses are permitted for 5.5 miles on a parallel dirt trail.

- Hikers can also travel the West Rim Trail on the opposite side of the gorge. At 30.5 miles, it's shorter than the Pine Creek trail but offers the same dramatic views.

- Primitive camping is permitted along Pine Creek in Tiadaghton and Tioga state forests with a free permit. Leonard Harrison and Colton Point state parks also have campsites.

- The paddling and moderate whitewater season on Pine Creek is generally March through May. Water is often too low for paddling in other months.

- Pine Creek Outfitters offers ample information for visitors. Contact them at pinecrk.com, 570-724-3003 or info@pinecrk.com. They also rent bikes, paddle craft and tubes, and offer car shuttles and guided adventures.

- For area accommodations, visit the Pine Creek Outfitters website and visitpottertioga.com. For more on Pine Creek and other outdoors attractions in the region, visit PaWilds.com.



Baling hay is a family affair on this farm in Terre Hill, PA. (Dave Harp)

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Swamp milkweed provides color to the edge of a Nanticoke River wetland in Maryland. (Dave Harp)

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The crabs in this bushel are "market size." (Dave Harp)

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A July full moon, known as the Buck Moon, rises over the mouth of Maryland's South River. (Michele Danoff)

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Baltimore's forgotten forest, an emerald in the rough



By Tom Horton

In 2018, a Baltimore City environmental journalism student contacted Joan Maloof. She wanted to interview Maloof, founder of an organization dedicated to protecting the very rarest of U.S. landscapes: old growth forests and forests well on their way to becoming old growth.

Less than 1% of such plant- and animal-rich original forest remains in the Eastern U.S. A perfect setting to meet, Maloof told her, lay improbably near the student's urban college — Gwynns Falls/Leakin Park, with nearly 2 square miles of old, diverse forest, all within Baltimore.

Shortly thereafter the student cancelled. One of her professors had convinced her that the site was “no place for two women to be walking alone,” Maloof recalls.

I'll confess that despite living in Baltimore for three decades, my last walk in that park before this May was close to 50 years ago, and mainly because I went to see what was going to be massively clearcut and paved to ram an interstate highway through the heart of the magnificent old woods.

Against all odds, the citizens who formed VOLPE (Volunteers Opposing Leakin Park Expressway) prevailed. John Volpe, Richard Nixon's secretary of transportation, provided the acronym for the opponents. And to this day, Interstate 70 East ends near the park boundary with a commodious parking lot and makeshift skateboard venue.

But the highway took its toll. Decades of uncertainty over the park's future had consigned it to a sort of limbo in city government, which let it fall into neglect.

And then there were the bodies, dozens and dozens found in the forest over the years, and an irresistible subject for the

media — from David Simon's *The Wire*, to the more recent podcast, *Serial*. In truth the park was no killing ground, just a convenient dumping ground.

But for too many, the great forest that cradles the Gwynns Falls and Dead Run as they meander and pool, then rush down to Baltimore Harbor remains an unexplored blank space: “It borders maybe 14 neighborhoods, and yet so many of those neighbors still see only some forest at the end of their street and have no idea it goes on for miles,” said Jill Jonnes, author of books on urban forests and a member of Friends of Gwynns Falls/Leakin Park.

(And about Dead Run: Jonnes says the name is from an old horse racing track near the stream, where the horses would come into the homestretch “at a dead run.” A recent large fish kill there from a watermain break, including hundreds of eels that had begun life far out in the Atlantic Ocean, showed Dead Run is hardly dead).

These days there's plenty of reasons for optimism about the park, the largest true forest within any East Coast city.

I walked there this spring with Jonnes and some other ladies. All of them are members of the thousands-strong Friends group. (Web search “Friends of Gwynns Falls/Leakin Park” and check out events, which include everything from 5K runs in the park to “forest bathing” experiences and miniature steam train rides.)

One of my walking companions told me she virtually raised her kids in the park. All of them find it a perfectly fine place for “women to be walking alone.”

Delicate spring beauty wildflowers sprinkled the hillsides as morning sun snagged the tops of towering tulip poplars. In glorious bloom was a grove of magnolias, as well as cherries and crabapples. Massive cypress and black walnut and a host of other native trees stud the park's hillsides.

The Friends organization has produced a digital map of the park's trails. A 15-mile bicycle trail that connects dozens of neighborhoods all the way up from Baltimore Harbor has brought in money for bridges, restrooms and other infrastructure. Outward Bound's Chesapeake Bay School has restored an 1860s mansion tucked into one



Jill Jonnes, left, Baltimore coordinator for the Old Growth Forest Network, and Bridget McKusker, board member of the Friends of Gwynns Falls/Leakin Park, walk one of the trails of the park. (Dave Harp)

edge of the forest, called Crimea, which serves as the school's headquarters.

To the west of that we passed the Carrie Murray Nature Center, a gift from Orioles Hall of Famer Eddie Murray to honor his mom. The park features an annual herb festival that draws thousands, and Dead Run hosts an annual derby where kids can catch trout released by the local Trout Unlimited chapter.

The city has closed most of the old access roads that were used by body dumpers. The ecological wonder of such an urban forest appears to be on the radar screen of Baltimore's mayor and city council.

All of this and more are signs that things are looking up. But the park, unpatrolled by the city and without dedicated rangers, remains underfunded. Even the “City Park” signs were provided by the volunteer Friends group.

But threats to the old forest's integrity never seem to stop. A natural gas pipeline took out roughly 900 old trees along a broad right of way. Estimates based on accepted economic valuations of forests show that the city sold the rights to the energy companies for a tenth of what they should have asked.

So now there's a push to incorporate approximately 900 acres, roughly three-quarters, of Gwynns Falls/Leakin Park into Maloof's Old Growth Forest Network. It is that organization's ambition to protect at least one tract of old growth forest, accessible to the public, in every county in the

nation capable of supporting trees — 2,370 counties, to be precise.

So far they've preserved 158 such forests in 28 states, from Florida to Oklahoma, Hawaii to New York. It's not just about creating a network of forests, Maloof said, but also about creating a network of people who care about forests.

“It's safe, it's old, it's beautiful, it needs to be protected,” she said of the west Baltimore emerald in the rough.

The Friends of the park are busy building a local constituency in surrounding neighborhoods (you can sign a petition on their website). “It's going to be a long haul, but it's going to happen,” Jonnes told me.

Ecologically, the case for protecting the park is a slam dunk: intact tracts of forest large enough to host a variety of birds that need deep-woods habitats are rare everywhere in the eastern U.S., let alone those that have been documented inside the Baltimore Beltway.

Socially, though, the jury's still out. I think that just as taxpayers statewide help support the financially beleaguered city's museums, symphony and art galleries, it's equally in our interest to support this unique forest. ■

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.

The skinny on shallow water: protected but vulnerable

By Dave Secor

Kayaking is such a simple and therapeutic pleasure. Shallow waters abound in the Chesapeake Bay, and car roof racks attest to its popularity. In tidal creeks, rivers and protected bays, passive glides bring nature's envelopment. Arms work against wind and tide. Immersion and exertion shed worries in the kayak's wake.

These skinny waters are also therapeutic for the Bay itself. They are its highest-functioning habitats: nurseries for fish, beds for reefs and underwater grasses, and incubators for the forage species that sustain oysters, crabs, fish and wildlife.

Little wonder then that these shallow waters receive the government's highest safeguards. The Chesapeake Bay Program applies its most stringent water quality standards to two classes of habitats: skinny tidal waters, including shoreline waters less than 2 meters deep, and migratory spawning reaches and nurseries, which are mostly shallow, upper estuarine waters where striped bass, perch, shad and other fish reproduce.

Twenty years ago, I worked with a team to develop these protections, and they have stood up well. Still, left in the wake of that effort are larger perils to skinny waters: climate change, invasive species and development in coastal rural counties.

Along the shores of the Potomac River, we summertime paddlers share skinny waters with countless 2-inch juvenile striped bass. Their numbers vary wildly year-to-year, depending on springtime egg and larval survival. Upriver to Nice Bridge, large females cast billions of eggs to the whims of spring weather. Early mortality is brutal, and bass have adapted by spawning repeatedly over long lifespans. A 30-year-old striped bass has more than 20 times at bat to replace herself.

Enter climate change. Spring is now a less predictable transition between seasons, narrowing the window of favorable conditions. Combined with recent overfishing and disease, most females get only one or two times at bat.

Protecting the nursery function of skinny waters against climate change thus has more to do with fisheries management —



With the water too shallow for paddling, a kayaker walks ashore off Tangier Sound. (Dave Harp)

maintaining older spawners — than improvements to water quality.

Enter blue catfish. From 1974 to 1985, Virginia introduced hundreds of thousands of them into freshwater rivers of the Lower Bay. But the fish had an unexpected predilection for brackish water, and within 20 years they had exploded in abundance, invading all major tributaries.

In a 2013 survey of a 7-mile stretch of the James River, Dr. Mary Fabrizio and her team at the Virginia Institute of Marine Science put the number of blue catfish at 1.6 million — more than the Bay's entire commercial harvest of striped bass. As the dominant predator, they're taking a big bite out of the juveniles that sustain our native fish. There is no obvious fix, but promoting harvests of blue catfish would help young striped bass and other native fish to evade predation.

Kayaking near Great Mills on the St. Mary's River requires a good deal of maneuvering between obstacles: submerged snags and overhanging trees and vegetation. This weaving and dodging, great sport in a kayak, is the result of coastal zone protections: Homeowners and small businesses along the river have helped conserve and even enhance shoreline vegetation. These zones of trees, swamps, marshes and undergrowth provide habitat and buffer skinny waters from runoff.

Enter coastal development. Strategic planning for Lexington Park in St. Mary's County concentrates a corridor of retail, industry and high-density dwellings along MD Route 235 — away from coastal zones. Yet the county is a narrow peninsula, so

the corridor straddles the headwaters of the St. Mary's River within 1–3 miles of tidal waters. Impervious surfaces exceed 10%, the threshold at which the conveyance of sediment, nutrients and other pollutants harms living resources.

In coastal rural counties and towns, these impervious spines of development continue to grow, paralleling and crossing skinny waters — for instance, along Southern Maryland's state routes 2, 4 and 5; Virginia's I-64 and state routes 3 and 17; and the Delmarva Peninsula's U.S. routes 50 and 13.

The stringent EPA protections for skinny waters, though notable in their achievements, have not kept pace with the threats.

The most important battle for conserving skinny waters is not in improving agricultural practices in Pennsylvania, nor is it in restoring oxygen to the Bay's deepest waters. It's proximate to the skinny waters themselves: actions that give living resources a fighting chance against climate change and other assaults. Essential actions include reversing overfishing, reining in blue catfish and extending coastal zone protections to those spines of coastal rural development.

On a recent paddle in the brackish part of the St. Mary's River, I reached down from my kayak and plucked a large live oyster from the sandy bottom. The water was crystal-clear except for dense patches of seagrass. There is much worth savoring and conserving here. ■

Dave Secor is a fisheries and environmental scientist at the University of Maryland Center for Environmental Science, Chesapeake Biological Laboratory.

LETTER TO THE EDITOR

Keeping chicken manure out of Bay by any means is a good thing

The comments in the June opinion column, *Maryland must stop pretending that poultry waste is clean energy*, by Lily Hawkins, deserve comment.

Preventing chicken waste from entering the Bay by any means is beneficial to the health of the Bay. Moreover, converting it to methane to be used and burned helps limit the use of fossil fuel. The carbon dioxide resulting from using the gas is a much weaker greenhouse gas than the methane that otherwise would enter the atmosphere. Farmers have been using methane from livestock for years for heating purposes. It is a practical solution to keeping it out of the atmosphere. The advantage of using methane from chicken manure is that it is not a fossil fuel and is sustainable.

Lastly, we should realize that there is really no such thing as “clean” energy. All forms of energy effect the environment, not only in terms of emissions but also in terms of the ecological effects of the production and disposal of energy-producing equipment and systems.

Keeping chicken manure out of our Bay by any means is a good thing.

*Arthur H. Mensch
West River, MD*

SHARE YOUR THOUGHTS

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

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

Do the math: Oysters can't be the cure-all for a clean Bay

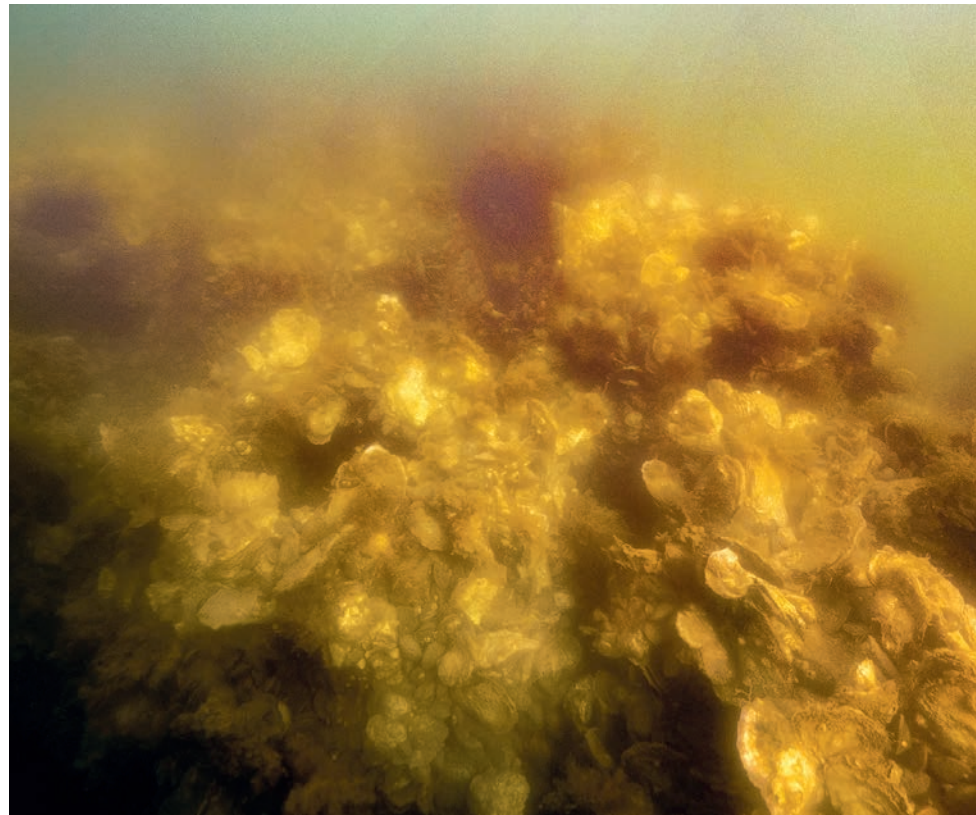
By Marc Castelli

Many years ago, marine biologist Roger Newell of the University of Maryland Center for Environmental Studies, now a professor emeritus, approximated that a single oyster could filter 50 gallons of water per day (gpd) under ideal conditions and oysters could have once (pre-1870s) filtered the Bay's entire volume every three days. Then, a number of years later, he re-evaluated and reduced the estimate to 30 gpd, because "ideal conditions" for oysters do not exist everywhere in the Bay and its tidal waters.

Still, many leading Bay organizations have stayed with 50 gpd and show this inaccurate oyster number on their websites. You can see it for yourself on the websites of the Chesapeake Bay Foundation, Coastal Conservation Association, ShoreRivers and Chesapeake Bay Program. More recently, another UMCES scientist took a closer look and reduced the estimated filtration rate even further. Matthew Gray, an assistant professor and researcher specializing in ecophysiology, was recently quoted in the *Bay Journal*, saying that when average water quality, water temperature and food availability are taken into account, the filtration rate is likely 12.5 gpd or lower, perhaps as low as 3 gpd.

With such reduced values, let's try some math to re-examine filtering the Bay with oysters. We'll start with 18 trillion gallons as the total volume of water in the Bay, as estimated by the Bay Foundation. Let's be conservative and use Newell's revised filtration estimate of 30 gpd per oyster, which means it would require 600 billion oysters to filter the Bay per day.

Filtering the entire Bay once every *three* days (Newell's original hypothetical time span for oyster filtration) would require 200 billion oysters. In 1885–86, Maryland's oyster harvest was at a historical peak of 15 million bushels — which, at 300 oysters per bushel, was about 4.5 billion oysters. So, 200 billion is more than 40 times the peak harvest. The point is, 200 billion is a *lot* of oysters, even when compared with the record harvest. Accepting the premise that there might actually have been that many



Oysters grow on a reef in Maryland's St. Marys River. (Dave Harp)

oysters in the Bay, you have to wonder: Where would they all fit?

Now ask, "How many acres are needed to hold all of them?" Assuming they could be grown at 10 oysters per square meter (which is conservative, compared with the threshold level of 15 per square meter for a good sanctuary population, per the Chesapeake Bay Program's oyster restoration metrics), this comes to about 40,000 oysters per acre. Dividing 200 billion by 40,000 yields about 5 million acres needed.

If you do the math using the Bay Program's much more ambitious goal of 50 oysters per square meter, or 200,000 per acre, you'd still need 1 million acres of oysters to filter the Bay once every three days. You will find that such a number of acres isn't physically possible in all of the Chesapeake Bay.

The Baywide estimate for actual oyster bottom — where they are growing or could grow — is about 50,000 acres. This is based on estimates by the relevant state agencies, the Maryland Department of

Natural Resources and Virginia Marine Resources Commission.

Yet at least 1 million acres to perhaps even 5 million are needed. This amount of habitat is 20–100 times greater than what actually exists. And it cannot be created, maintained or sustained in order for oysters to do the job that would-be Maryland governor Peter Franchot claims (along with the Bay Foundation, Coastal Conservation Association and ShoreRivers) that oysters could do.

Simply put, the acreage needed to clean the Bay with oysters doesn't exist. Even if one considers that the Bay could be cleaned using oysters and other approaches (sewage plant upgrades for example), the point is you still need the acreage to hold the oysters. Those 1 to 5 million acres don't exist. Remember that in this exercise we used the 30 gpd filtration value, not the even less credible 50 gpd mantra.

Now insert the more accurate 3.0 to 12.5 gpd and watch the impossibility explode. At 12.5 gpd, we'd need 2.4 million acres of

oyster habit. At 3 gpd, it's more like 10 million acres, more than twice the acreage of the entire Bay and all of its tidal tributaries.

It is right about here where I should acknowledge that no serious scientist is arguing that all we need to do to save the Bay is put in enough oysters, or that any number of oysters would literally filter the entire Bay every three days. The point is, the 50 gpd figure is mythical. It's not about science anymore; it's about keeping the money pouring into oyster restoration programs — when so much of that money could be better spent on other Bay restoration initiatives.

There is a serious need for Bay organizations and the public to first realistically discuss the acreage available and then the oyster population that realistically might be attained, to estimate how much water oysters might actually be able to filter. But the real answer will not impress the public, advantage the politicians or raise money for nonprofits, which is probably why you haven't seen sensible science and conversation on this question.

None of this is meant to understate the value of oysters; they provide ecological and economic benefits. More oysters are a desirable result, but cleaning the Bay is about far more than oysters. They are only one small component, about which the public has been misinformed.

Certainly, oysters can *help* the Bay, and they are important for the Bay, the seafood industry and the regional economy. But as for filtering the Bay gin-clear with oysters, that's a pipe dream.

I once heard an experienced oyster biologist suggest that as the public contemplates trying to clean the Bay with oysters, we should work even harder to clean the Bay *for* oysters. It is incumbent on all of us to find a better way to clean the Bay. And perhaps in doing so remember that watermen can be and are a part of the solution. The Bay is big enough for us all. ■

Marc Castelli is an artist specializing in watercolor paintings of working watermen, traditional workboats and racing log canoes. He lives on Maryland's Eastern Shore.

CHESAPEAKE CHALLENGE

— Kathleen A. Gaskell

The odds are against a shark attack... Even so, here are some safety tips

A

The odds of a shark attack in the U.S. are 1 in 5 million. Average global deaths from shark attacks: less than 10. Annual average worldwide deaths from being hit by a champagne cork: 24.

Number of unprovoked shark attacks in the Bay: 0. Still, for those who vacation elsewhere, here's some advice.

Safety in numbers: Sharks are more likely to bite an isolated individual. Swim amid other people. The other advantage is that if an attack occurs, people will be nearby to help.

Avoid their dinner hours and hangouts: Sharks are not only more active at night, dawn and dusk, but they can see you better than you can see them at these hours. Stay away from sandbars and steep drop-offs.

Don't act or look like food: Sharks have a heightened sense of smell and can track down the tiniest amount of blood. If you are cut, stay out the water. Glittery or shiny jewelry looks like fish scales underwater. A shark's sense of sight is especially attuned to contrast: If you are unevenly tanned or wearing a brightly colored swimsuit, you are more likely to look like prey, especially in murky water. Splashing is not a good idea, because it can make you appear like prey in distress. This is especially true for pets in the water.

Don't get chummy with their food:

People who are fishing often use chum or bait fish, which attract sharks. See diving seabirds? Not good. It most likely indicates the presence of bait fish.

Don't be myth-taken: It's been said that sharks won't be present if dolphins are swimming nearby. That is not true.

Cue the Jaws theme song: If you spot a shark, leave the water quickly and with as little splashing as possible. Warn others! The shark may only be curious and not likely to bite unless provoked. Even if it bites, this might be only a warning to back off. Comply. In the rare event that it is an actual attack, experts say to fight back (continually heading to shore, if possible). Punch the shark's nose, gills or eyes, the parts where it is most sensitive.



Icon: Sandbar shark (Max Sang/Flickr)

A Bull sharks are euryhaline fish, which means they can swim in a range of salinities. (Public domain)

B Smooth dogfish have 10 rows of flat teeth, which crush and grind prey instead of biting them. (D. Ross Robertson/Smithsonian Institution)

C Spiny dogfish is often the main ingredient in "fish and chips" in Europe. (Doug Costa, National Oceanic & Atmospheric Administration/Stellwagen National Marine Laboratory)

D The sand tiger shark is often seen in aquariums because of its adaptability to captivity. (Jeff Kubina/CC-by-SA-2.0)



C



D

A quiz to sink your jaws into

At least 12 shark species have been observed in the Chesapeake Bay. Can you match the five most common species with their descriptions? Answers are on page 44.

Sand tiger shark Spiny dogfish
Sandbar shark Smooth dogfish Bull shark

1. Look for the Chesapeake Bay's most common shark species in summer and fall, when the estuary is one of its most important nursery areas on the East Coast. This 6- to 8-foot shark prefers areas with a smooth bottom, where its prey — fish, smaller sharks, rays and blue crabs — are found.
2. This shark makes summer visits to the Bay. It has a gland that lets it swim in both salt and freshwater and has been found in Maryland's Patuxent River. One of the three most dangerous shark species, it has yet to pose a major threat in the Bay. It can grow up to 11.5 feet long and weigh 500 pounds by eating fish, rays, smaller sharks, crustaceans, turtles and even aquatic mammals.
3. This 10-foot shark swims in the Lower Bay in summer and fall. A female has hundreds of fertilized eggs and several fetal sharks in each of her two uteri. By the time she gives birth, though, only one pup is left in each uterus; it has eaten the other eggs and its siblings. This nocturnal bottom feeder eats mostly fish and squid.
4. This 3-foot summer and fall visitor is common in the Lower Bay, in waters less than 60 feet deep. It travels in packs along the bottom, eating crustaceans, mollusks, squid and small fish. It is generally shy and avoids humans.
5. This 4-foot, large-eyed, slow-swimming shark is usually found in the deeper waters of the Lower Bay south of the Potomac River in late fall through early spring. Behind its dorsal fins are spines that shoot venom at would-be predators. It often travels in packs with hundreds of its kind, preying on herring, shrimp, crab, squid and octopus.



BULLETIN BOARD

VOLUNTEER OPPORTUNITIES

WATERSHEDWIDE

Project Clean Stream

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

Potomac River watershed cleanups

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

Citizen science: butterfly census

Friend of the Earth, an initiative of the World Sustainability Organization, has launched a *Global Butterflies Census* to raise awareness about butterflies & moths, their biodiversity; collect population data; better understand their behavior. To participate: When you see a butterfly or moth, take a close picture without disturbing it, then send it by WhatsApp message to Friend of the Earth along with your position's coordinates. The organization will reply with the species' name and file the info on the census' interactive map, database. Data are used to design conservation measures to save these insects from extinction. Info: friendoftheearth.org.

Clean Swell App

Use the Ocean Conservancy's free *Clean Swell* app to upload stream cleanup results to a database providing a global snapshot of trash, supplying researchers, policy makers with insight. Web search "Ocean Conservancy Clean Swell App."

PENNSYLVANIA

Middle Susquehanna River

Get involved with the Middle Susquehanna Riverkeeper Association. Contact Riverkeeper John Zaktansky at 570-768-6300, midsusriver@gmail.com.

- *HERYN (Helping Engage our River's Youth with Nature)*: Assist with youth outdoor activities.
- *Susquehanna Stewards*: Deliver programs, info to people in your region, help develop new initiatives.
- *Water Reporter App*: Track fish health in the Middle Susquehanna watershed by sharing photos, info about catches via an app. Also upload pictures of river activities. Reports, interactive map available at middlesusquehannariverkeeper.org.

VIRGINIA

Citizen science: Ghosts of the coast

The Gedon Lab at George Washington University and the Virginia Coast Reserve Long-Term Ecological Research project are documenting the formation of ghost forests created by rising sea level. Submit observations to storymaps.arcgis.com/stories.

Reedville Fishermen's Museum

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

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@pwsacd.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, river cleanups. Projects, internships for high school, college students. Info: Holly Geary at 540-687-3073, info@goosecreek.org, goosecreek.org/volunteer.

Become a water quality monitor

Volunteer with the Izaak Walton League or train online to become a certified Save Our Streams water quality monitor. Follow up with field practicals, then adopt a site of your choice in Prince William County. Info: Rebecca Shoer at rshoer@iwla.org, 978-578-5238. Web search "water quality va iwla."

- *Stream Selfies*: Collect trash data, take photos of local stream.
- *Salt Watchers*: Test for excessive road salt in a stream.
- *Check the Chemistry*: Spend 30 minutes at a waterway with a handful of materials, downloadable instruction sheet.
- *Stream Critters*: Use app to identify stream inhabitants. Number, variety of creatures reveal waterway's condition.
- *Monitor Macros*: Become a certified Save Our Streams monitor with one day of training. Learn to identify aquatic macroinvertebrates, assess habitat, report findings, take action to improve water quality.

Chemical water monitoring teams

Help the Prince William Soil and Water Conservation District and VA Department of Environmental Quality by joining a chemical water quality monitoring team. Training provided. Monitoring sites are accessible. Info: waterquality@pwsacd.org, pwsacd.org.

Check out cleanup supplies

Hampton Public Libraries have cleanup kits that can be checked out year-round, then returned after a cleanup. Call your local library branch for details.

Virginia Living Museum

Virginia Living Museum in Newport News needs volunteers and interns ages 11+ (11-14 w/adult) to work alongside staff. Opportunities include educating guests, native plant propagation, installation of new exhibits. Some positions have age requirements. Adults must complete a background check (\$12.50). Financial aid applications available. Info: volunteer@thevlm.org.

MARYLAND

CBMM volunteer meeting

The Chesapeake Bay Maritime Museum in St. Michaels, has scheduled virtual meetings 2-3 pm Sept. 13 & 12-1 pm Nov. 12 to invite teens and adults to become volunteers. Opportunities include guiding tours & programs, exhibitions, collections, caring for grounds & gardens, helping with the Floating Fleet, working in shipyard. Free, registration required: bit.ly/CBMMVolunteerInterest. Applications for would-be volunteers: cbmm.org/support/volunteer.

Certify your pollinator garden

Gardeners whose yards are planted with native, pollinator-attracting species can apply for the Lower Shore Land Trust's *Certified Pollinator Garden Program*. Participants receive a sign for their yards. Web search "LSLT pollinator certify." Info for landowners interested in creating these landscapes: kculbertson@lowershorelandtrust.org.

Invasive Species Tool Kit

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

Lower Shore Land Trust

The Lower Shore Land Trust works with individual landowners who wish to protect the natural heritage of their properties. Info: lowershorelandtrust.org/volunteer-sign-up.

Anita Leight Estuary Center

Remove invasive plants, install native species 9-11 am July 17 & Aug. 14 at the Anita C. Leight Estuary Center in Abingdon. Volunteers, ages 14+, learn about problem plants, removal & restoration strategies. Wear sturdy shoes, long sleeves, work gloves. Weather permitting. Preregistration required: 410-612-1688, 410-879-2000 x1688, otterpointcreek.org.

Severn River Association

Join the Severn River Association's 2022 water quality monitoring crew. Visit 51 stations from the river's mouth to its headwaters. Info: Jack Beckham at fieldinvestigator@severnriver.org.

Submission Guidelines

SUBMISSIONS

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

DEADLINES

The *Bulletin Board* contains events that take place (or have registration deadlines) on or after the 11th of the month in which the item is published through the 11th of the next issue. Deadlines are posted at least two months in advance. 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 kgaskell@bayjournal.com. Items sent to other addresses are not always forwarded before the deadline.



Answers to CHESAPEAKE CHALLENGE on page 41

1. Sandbar shark
2. Bull shark
3. Sand tiger shark
4. Smooth dogfish
5. Spiny dogfish



BULLETIN BOARD

Maryland State Parks

Search for volunteer opportunities in state parks at ec.samaritan.com/custom/1528. Click on "opportunity search" in volunteer menu on left side of page.

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: 410-461-5005, volunteerpatapsco.dnr@maryland.gov.

Breeding Bird Atlas project

Help the Breeding Bird Atlas of Maryland & the District of Columbia — a project documenting the distribution, abundance of local breeding bird populations — by looking for nests. Data are used to manage habitat, sustain healthy ecosystems. Info: ebird.org/atlasmdc/about.

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.

Annapolis Maritime Museum

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

St. Mary's County museums

Join the St. Mary's County Museum Division Volunteer Team or Teen Volunteer Team.

■ **Adults:** Assist with student/group tours, special events, museum store operations at St. Clement's Island Museum or Piney Point Lighthouse Museum & Historic Park. Work varies at each museum. Info: St. Clement's Island Museum, 301-769-2222. Piney Point Lighthouse Museum & Historic Park, 301-994-1471.

■ **Students:** Ages 11+ Work in the museum's collections management area on artifacts excavated in the county. Info: 301-769-2222.

National Wildlife Refuge at Patuxent

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

Ruth Swann Park

Help the Maryland Native Plant Society, Sierra Club and Chapman Forest Foundation remove invasive plants 10 am–4 pm the second Saturday in August, September and October 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.

Chesapeake Bay Environmental Center

Volunteer at the Chesapeake Bay Environmental Center in Grasonville a few times a month or more often. Help with educational programs; guide kayak trips, hikes; staff the front desk; maintain trails, landscapes, pollinator garden; feed or handle captive birds of prey; maintain birds' living quarters; monitor wood duck boxes; join wildlife initiatives. Or, participate in fundraising, website development, writing for newsletters, events, developing photo archives, supporting office staff. Volunteering more than 100 hours of service per year earns a free one-year family membership to CBEC. Info: volunteercoordinator@bayrestoration.org.

Citizen science: angler surveys

The *Volunteer Angler Survey* smartphone app helps the Department of Natural Resources collect species, location, size data used in developing management strategies. Surveys: artificial reef initiative, blue crab, freshwater fisheries, muskie, shad, striped bass. Win quarterly prizes. Info: dnr.maryland.gov/Fisheries/Pages/survey/index.aspx.

FORUMS / WORKSHOPS

VIRGINIA

Water monitoring conference

The 2022 Virginia Water Monitoring Council conference, *Exploring Emerging Water Issues*, takes place 9 am–4 pm Aug. 4 at Henrico County Training Center, in Henrico. Registration of \$80 includes morning coffee, lunch, snacks. Deadline is 5 pm July 29. Free parking on site. No refunds; substitutions allowed. Web search "VA water monitoring council 2022" or contact Sophie Stern at 804-793-8792, sstern@allianceforthebay.org.

WEST VIRGINIA

Biochar & Bioenergy conference

Biochar 2022, Decarbonizing our Economy, takes place Aug. 8–11 at the Morgantown Marriott at Waterfront Place. The 2022 North American Biochar & Bioenergy conference will focus on bridging scientific, industrial, practitioner & policy gaps in biomass use for biochar and bioenergy production, including sustainability issues at local-to-global scales. Expected sessions include *Carbon Markets & Circular Economies; Bioenergy & Other Value-Added Bioproducts, Production & Commercialization; Environmental Restoration & Remediation; Climate-Smart Agriculture & Forestry, Biochar Production & Commercialization*. Pre-conference workshops: *Biochar Industry Association/Standards & Certification; Biomass, Biochar Stakeholder Focus & Engagement; Life Cycle assessments for Biochar Facilities and Carbon Markets*. A post-conference field trip includes biomass projects and demo of the Charboss, a mobile biochar production machine. Pre-conference workshops, post-conference field trips are available to conference and nonconference attendees. Check website for range of fees. Info: info@biochar2022.com, biochar2022.com.

EVENTS / PROGRAMS

PENNSYLVANIA

Susquehanna River ranger

Explore Susquehanna River-related topics at River Ranger Hours 10–11 am; July 26 (*Take a Hike*) Aug. 2 (*Sun Fun*); Aug. 9 (*Junior Ranger Day*) at the Zimmerman Center for Heritage in Wrightsville. Children ages 5+ (w/adult) take home a different Chesapeake Trail trading card each time they attend. Free, registration required. Info: web calendar for Susquehanna National Heritage Area. Registration: 717-449-5607.

Parks & forests photo contest

Pennsylvania Parks and Forests Foundation is accepting submissions for its photo contest, which this year celebrates the 50th anniversary of the Clean Water Act as well as role of forests in watershed health. Categories: *Water is Life, Caught in the Rain, Raindrop to River, Reflections, Forests, and Young Photographers* (ages 12–17). Amateurs, professionals welcome. All photos must be taken in a Pennsylvania state park or forest. Deadline: Sept. 30. Info/contest details: paparksandforests.org.

VIRGINIA

Junior Ranger Angler

The Watermen's Museum in Yorktown's *Junior Ranger Angler* program, 10 am–2 pm July 16, teaches children of all ages the basics of fishing, history of fishing in the Bay. Make fishing-inspired art. Complete activities to receive Junior Ranger Angler badge. All equipment provided. Wear sunblock, protective clothing. Free, no registration. Info: Remi Shaull-Thompson at 757-856-1220.

Amazing Pollinators exhibit

The Virginia Living Museum in Newport News has a new bilingual (English/Spanish) exhibit, *Amazing Pollinators*, which runs through Sept. 18. In its centerpiece, visitors become a specific pollinator and must navigate survival missions through a maze. To succeed, players must think like a pollinator and navigate the many challenges faced by each pollinator daily. Elsewhere, guests learn how to help pollinators in their area through graphics and interactive activities. A game parlor includes classic games with a twist: *Mason Bee Mancala, Invasive Species Shuffleboard, Mutualism Dominoes*. In the *Maze Flower Quest* area, children choose a pollinator to fly to its target flower in a maze. Two daily shows complement the exhibit. *The Pollinators & Pals Animal Show* (12, 1 & 2 pm), introduces Virginia native animal ambassadors and shows how they interact with pollinators. *The Science Show Live* (11:30 am & 2:30 pm) demonstrates pollinators' role in an ecosystem. Info: thevlm.org, 757-595-1900.

Second Sunday Hikes

Greater Prince William Trails Coalition offers hikes that explore places in Prince William, Manassas and Manassas Park (weather permitting) 1–3 pm the second Sunday of every month through 2022. Info: info@gpwtrails.org

Cycle Prince William County

The bicycling 2022 *Tour of Prince William* takes place 7 am–3 pm July 23. Choose from 20-mile or 62-mile metric century (can be shortened at rider's discretion) that begins and roughly ends the Brentsville Courthouse Historic Centre. It includes urban, suburban, exurban, rural, forested, town, flat and hilly areas, several Prince William County historic sites. Participants must check in on race day, sign liability release, waiver & rider behavior policy documents, pick up race packet. Helmets, ID required throughout ride. Wear brightly colored or reflective clothing. Mount a rear bike light. Event occurs rain/shine.

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No refunds will be issued. Registration: \$50 by July 22. (\$55 on July 23) includes cue sheets, event number, rest stop food & drinks, mechanical support during the ride. Proceeds benefit Prince William Trails and Streams Coalition and Prince William Historic Preservation Foundation. Info tourofprincewilliam.org.

MARYLAND

Prizes offered for tagged snakeheads

Help monitor invasive northern snakeheads in the Chesapeake Bay and Blackwater River. The MD Department of Natural Resources and U.S. Fish and Wildlife Service are placing yellow or blue tags on up to 500 northern snakeheads. Each tagged snakehead harvested until 2024 could be rewarded with a gift card of \$10 or \$200 depending on the tag. To qualify, the harvester must report the tag number to USFWS at 800-448-8322 and include a picture of the tagged fish. Only snakeheads with tags qualify for gift cards. The goals are to learn if population benchmarks are being reached, control the species' spread. Its numbers are increasing in the Upper Bay, and it is a likely predator of fish in Blackwater River. Harvesting snakeheads reduces predation pressure. The snakehead is a tasty and nutritious food source. Web search: "MD DNR snakehead tagging."

Youth Fishing Derby

Youth throughout the Bay region are invited to the 16th Annual Kent Island Fishermen Youth Fishing Derby Aug. 20 at the Romancoke Pier on Kent Island. Trophies (one per child) are awarded for largest, smallest, most unique and most fish caught in each age group: 3-5, 6-10, 11-16. Registration begins at 8 am; fishing takes place 9-11 am; refreshments, prize presentations (must be present to win) are scheduled 11:30 am to 1 pm at Kent Island American Legion, #278. Parent or adult must accompany each participant. Youth are asked to bring their own rods, only a few loaners are available. Bait provided. Free. Info: wotwater@atlanticbb.net, 202-489-7638.

Delmarva Bird Conservation Series

Delmarva Bird Conservation Series, presented by the Lower Shore Land Trust and the Eastern Shore Land Conservancy, focuses on land and conservation efforts that support bird populations. Registration required for both programs. Web search "lowershorelandtrust.org/blog." Click on events.

■ *Colonial Bird Nesting*: 9 am-12 pm July 18. Meet at Sunset Marina in Ocean City. Boat tour reveals a makeshift nesting site in Maryland's coastal bays that's providing crucial nesting site for threatened bird populations. \$35.

■ *Economics of Bird Conservation*: Virtual program. 1-3 pm July 26. Bird conservation leaders highlight how birds, birding have power to amplify conservation, stewardship, community outreach. Free.

Anita C. Leight Estuary Center

Take part in any of these programs at the Anita C. Leight Estuary Center in Abingdon. Ages 12 & younger w/adult. Meet at center. Registration required for all programs; payment due at registration. Info: 410-612-1688, 410-879-2000 x1688, otterpointcreek.org.

■ *Trail Running*: 9-10 am July 16 & Aug. 13. Ages 8+ (16 & younger w/adult). All skill levels/paces welcome. 2-mile, out & back, single track. Free.

■ *Buzz, Squawk, Splash Canoe*: 8-10:30 am July 16. Ages 8+ Look for insects, birds, fish, frogs, turtles, tadpoles. \$15.

■ *Critter Dinner Time*: 1:30 pm July 23 (register by 6/17) & 10:30 am Aug. 13 (register by 8/12). All ages. Learn about turtles, fish, snakes while watching them eat. Free.

■ *Evening on the Marsh Canoe*: 4-7 pm July 23. Ages 8+ Paddle Otter Point Creek marsh, swamps. \$15.

■ *Bumblin' Bees*: 1:30-2:30 pm July 24. Ages 3-6. Story, craft, outdoor exploration. \$10/child. Register by 7/20.

■ *STEAM into Nature Summer Nature Program*: 9 am-3 pm July 25-29. Ages 5-7. Using the outdoors as a model, explore how things work, apply STEAM (science, technology, engineering, art, math) to produce models, projects. \$175/child.

■ *Splashing on the Shore*: 2:30-4 pm July 30. Ages 3+ At low tide: dig channels, search for clams, find clumps of natural clay. Free. Register by 7/29.

■ *Meet a Critter*: 1 pm July 31 (register by 6/24) & Aug. 21 (register by 8/20). All ages. Live animal program. Free.

■ *Nature Discovery Tots*: 10:30 am Aug. 6. Ages 6-0. Explore Nature Discovery Area w/ naturalist. Seasonal themes. Free. Register by 8/5.

■ *Wildflower Wandering Canoe*: 2-4:30 pm Aug. 6. Ages 8+ Look for flowers. \$15/person

■ *Terrific Turtles*: 1-2 pm Aug. 7. Ages 4+ Meet live turtles, look for them on trails. Turtle craft. \$10/family. Register by 8/3.

■ *Whet Your Interest in Wetlands Canoe*: 2-4:30 pm Aug. 7. Ages 13+ Learn what wetlands consist of, why they're so important for the Bay. \$15.

■ *Picture Perfect Canoe*: 8:30-11 am Aug. 13. Ages 8+ Paddle to enhance your photo gallery. \$15.

■ *Full Bloom Canoe*: 9-11:30 am Aug. 14. Ages 8+ Paddle among summer blooms of Otter Point Creek marsh. \$15.

■ *Summer Selfie Scavenger Hunt*: 1-3 pm Aug. 14. Ages 4+ Explore the park. Finish the list, report back for a prize. \$10/family. Register by 8/10.

■ *Magnificent Monarchs*: 10:30 am-12 pm Aug. 20. Ages 8+ Learn how to help these butterflies. Free. Register by 8/19.

■ *Butterflies of Creek Canoe*: 3-5:30 pm Aug. 20. Ages 8+ Look for butterflies seeking nectar from wildflowers. \$15.

■ *Flowers of the Marsh Kayak*: 9-11:30 am Aug. 27. Ages 8+ Paddle through channels to search for wildflowers. Register by 8/26. \$15.

■ *Dragonfly Days*: 1-2 pm Aug. 28. Ages 5+ Capture, examine, release these predators. Make a dragonfly creation. Register by 8/27. \$10/family.

Winnie Estelle Cruises

Cruise aboard the Chesapeake Bay Maritime Museum's 1920 buyboat *Winnie Estelle*. Cruises, from the museum in St. Michaels, are dependent on weather, boat & water conditions.

■ *Log Canoe Races*: 9:30-11:30 am July 30; 1:30-3:30 pm July 30 & 3-5:30 pm July 31. Watch these vessels with long masts & sails keep upright up to speeds of 10+ knots, thanks to crew climbing to ends of 15-foot boards hanging off the side of the canoe as they race along Chester, Miles, Choptank, Tred Avon rivers. \$40. Register: bit.ly/CBMMcruises.

■ *Racing Spectator Cruise*: 5:30-7:30 pm Aug. 3. Watch sailboat races on Miles River. \$30.

■ *Sunset Cruise*: 7 p.m. Aug. 5, \$45. Register: bit.ly/CBMMSunsetCruise.

■ *Eco Cruises*: 1-2:30 pm Aug. 18. All ages. Explore Bay's habitat up close. Try your hand at water testing, learn about oyster reef inhabitants. \$25. Register: bit.ly/CBMMcruises.

CBMM kayak paddles

The Chesapeake Bay Maritime Museum in St. Michaels is offering several kayak paddles. Beginner & intermediate paddlers, ages 16 or younger w/adult. Unvaccinated paddlers are asked to wear masks. Registration required for all paddles.

■ *Guided Paddle & Tasting*: Wear sunscreen, bring water & snacks for duration of the paddle. \$55 (BYO kayak & PFD) or \$75 (rent kayak/PFD from CBMM) and includes tastings. Info: bit.ly/PaddlePrograms. Paddles:

• 9 am-1 pm July 30 (rain date: 7/31) Paddle Pickering Creek, explore Pickering Creek Audubon Center, sample fresh-pressed juices from Agave Arts & Juicing Co.

• 9:30 am-1:30 am Aug. 27 (rain date 8/28) Paddle Tred Avon River to watch log canoe race, then paddle Town Creek for a cup or cone from Scottish Highland Creamery.

■ *Paddle with CBMM President Kristen Greenaway*: 5:30-7:30 pm Sept. 21 (rain date: 9/22) Beginner, intermediate paddlers. Relaxed paddle along the Miles River and up Long Haul Creek. Bring water, head lamp. Learn to use a Greenland paddle. \$30 (BYO kayak & PFD); \$50 (rent kayak/PFD from CBMM). Info: bit.ly/GreenawayPaddle.

Youth fishing rodeos

Youths, ages 3-15, are invited to take part in MD Department of Natural Resources' *Youth Fishing Rodeo*. All rodeos are free but require registration; see info for each site. Most events provide bait, fishing gear and have volunteers on hand to help youths learn to fish. Attendees should web search "md dnr youth fishing rodeo" for cancellations or rescheduling.

■ *Worcester County*: 9 am July 17. South Pond. Info: Lee Phillips at 410-208-1575.

■ *Frederick County*: 10 am Aug. 20. Nallin Pond. Info: Gabriel Maher at 301-619-2538.

Tour Horn Point Lab

The University of Maryland Center for Environmental Science Horn Point Lab in Cambridge is offering 90-minute campus tours at 10 am every other Tuesday through Labor Day. Visitors, ages 10+, learn about physical oceanography, eDNA, water quality, coastal resilience, oysters. Info: 410-221-8383, hpl tours@umces.edu.

MD Park Quest: pollinators

The theme of Maryland Park Service's Park Quest 2022 is *Parks for Pollinators*. Participants learn about these creatures, their habitats while visiting state parks and completing activities (many self-guided) before Oct. 31. Complete 12 or more quests to be eligible for prize drawing (stickers, magnets, bandanas, Annual State Park & Trail Passport). The quest itself is free, but events and park day-use fees may apply. No preregistration. To print a free copy of the Park Quest 2022 Passport Booklet, web search "dnr park quest 2022." Details, including bonus events, monthly trivia questions for prizes, are found in the online Park Quest newsletter (chesapeakefamily.com/enewsletter-sign-up). Info: Melissa Boyle Acuti at melissa.boyle@maryland.gov.

Wilma Lee skipjack cruises

The Annapolis Maritime Museum & Park invites the public to take a cruise on its historic skipjack *Wilma Lee* through October. Tickets, to be released in two-week increments, are available online or at the museum's front desk 10 am-3 pm Tuesday-Sunday. \$45/adults; \$20/ages 12 & younger. Details about each cruise are found on the ticketing site: web search "wilma lee cruises."

DNR photo contest

The Department of Natural Resources is accepting entries for its photo contest until Aug. 1. It's open to state residents and visitors, but only photos (birds, insects, flora, recreation, scenic landscapes or wildlife) taken in Maryland can win. Winning entries will be posted online and appear in *Maryland Natural Resource* magazine and the 2023 DNR wall calendar. The overall grand prize winner receives a \$500, one-year Maryland State Park and Trail Passport, free



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magazine subscription and five copies of the calendar. First through third place winners also receive prizes. Social media users can choose a "fan favorite" via facebook.com/MarylandDNR. Info: dnr.maryland.gov/Pages/photocontest.aspx.

Free admission for military

Museums and historic sites of the St. Mary's County Department of Recreation & Parks' Museum Division will offer free admission for active members of the armed forces, as well as up to 5 family members, through Sept. 5 as part of the *Blue Stars Museum Program*. Participants include St. Clement's Island Museum and Piney Point Lighthouse Museum. (Free admission does not apply to the water taxi at St. Clement's Island Museum.) The program is available for those currently serving in the U.S. Army, Navy, Air Force, Marine Corps, Coast Guard as well as Active Duty and Reservists, National Guardsman (regardless of status), U.S. Public Health Commissioned Corps, NOAA Commissioned Corps, and up to five family members. Qualified members must show a Geneva Convention common access card, DD Form 1173 ID card, or a DD Form 1173-1 ID card. The military ID holder can be either an active duty service member or dependent family member with appropriate ID card. The active duty member does not have to be present for family members to use the program. Spouses of deployed military are eligible for Blue Star Museums with appropriate identification.

Ladew Topiary Gardens

Upcoming programs at Ladew Topiary Gardens in Monkton include:

- *Little Explorers*: 10:30-11:30 am or 12:30-1:30 pm July 26 (*Art in our Garden*); Aug. 23 (*Hum Hum Hummingbirds*) Sept. 13 (*Beautiful Water Lilies*). Ages 2-6 w/adult. Nature walks, stories, songs, ABCs & 1,2,3s. Per session fee of \$20 per child/adult pair, \$6 each extra sibling, includes admission to gardens, nature walk (through October), butterfly house (in season). Pre-registration recommended. Info: LeeAnne Kahl at 410-557-9570, lkahl@LadewGardens.com.
- *In the Garden Series*: 9 am Aug. 9 (*Adaptation & Evolution: How Plants Survive*). Learn advanced gardening skills from Ladew gardeners. Fee of \$20 per session includes admission to gardens. Pre-registration required.
- *Native Bees*: 10 am-12 pm Aug 11. Pollinator biologist Clare Maffei of U.S. Fish and Wildlife Service will discuss the state's 400 native bee species. Look for bees in the gardens. \$20.
- *Fall Bird Count*: 9:30-11:30 am Sept.10. Walk with ecologist John Canoles of Eco-Science Professionals along Nature Trail to catalog the fall bird activity. Ages 13+ \$20. Info: LeeAnne Kahl at 410.557.9570 x223, lkahl@LadewGardens.com.

Work in CBMM's shipyard

Work alongside professional shipwrights at the Chesapeake Bay Maritime Museum in St. Michaels. Workdays are scheduled 10 am-4 pm July 23, Aug. 6, Sept. 10 & 11, Dec. 3. Construction, restoration projects vary weekly and include a small boat restoration and a 40-foot Chesapeake Bay buyboat new build. \$60 per session. Registration required: bit.ly/ShipyardWorkdays.

Piney Point children's program

Piney Point Lighthouse Museum in Leonardtown invites children, ages 6-11, to a 4-day outdoor STEAM (science, technology, engineering, arts and technology) program 9 am -12 pm July 18-21. Park exploration, crafts, activities focus on new theme each day: native trees & birds; local insects; fishing & crabbing; water, air & light. Participants take home exploration materials to explore with their families, create field journals based on their discoveries. \$40. Registration required: 301-994-1471, facebook.com/1836Light.

RESOURCES

WATERSHEDWIDE

Susquehanna River CD

The Middle Susquehanna Riverkeeper Association is offering *Songs of the Susquehanna - Volume 2*, a CD collection of 20 diverse, original songs inspired by the river and performed by some of the region's best musicians. The cost of the CD is \$15. A two-CD package of Volumes 1 & 2 is available for \$25. The CD can be purchased at the Riverkeeper Association's Sunbury office or ordered at middlesusquehannariverkeeper.org. Proceeds benefit the organization's programs.

Farm tool, equipment sharing forum

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

Chesapeake Network

Join the Alliance for the Chesapeake Bay's Chesapeake Network (web search those terms) to learn about events and opportunities that protect or restore the Bay, including webinars, job postings and networking.

John Wright Speaker Series

Recent additions to the Severn River Association's *John Wright Speaker Series*, available on the SRA website, severnriver.org, (click on Resource Library in the menu) include:

- *Annapolis Lighthouses - Lost Treasures in a Changing Region*: Bob Stevenson, education coordinator of Chesapeake Chapter of the United States Lighthouse Society, will discuss history of Bay lighthouses.
- *Hiking the Severn ... and Beyond*: Jeff Holland, former West and Rhode Riverkeeper, writer, author, songwriter, naturalist and poet, shares his favorite 10 hiking trails along the waterways of the Severn River and greater Anne Arundel County.
- *Beaver - Coexisting with a Resourceful Resident*: Rachel Ort, eco-credits market coordinator with Ecotone, discusses the ways beaver help protect a waterway by creating wetlands that capture stormwater runoff, help to filter out pollutants.

Magothy River classic boats

Youtube videos in the Magothy River Association's living history documentary series, *Vintage Boats of the Magothy*, include:

- *Jolly Dolphin*: This three-part video that tells the story about this wooden sailboat found on the Upper Magothy near Riverdale. The first is an overview, the second focuses on its restoration and the third shows off its engine, rigging and sails. Web search: "Jolly Dolphin classic boat."
- *Emily Anne*: Learn about this 1940 Vee-Bow tugboat, built in Baltimore, and its restoration. Web search: "Emily Anne classic boat."
- *PATCHES*: The first of this two-video series features an overview of a 1929, 29-foot Richardson cruiseabout. The second, *The Unexpected Classic Boat*, tells the story of the craft and Paul Spodoro, its owner since 1978, who initially only wanted a shelter to study away from town. Learn about the transformation of PATCHES into a "classic boat."

NOAA interpretive buoys

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

MARYLAND

Fishing report

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

Piney Point coloring pages

Learn about Piney Point Lighthouse Museum & Historic Park in Piney Point while coloring pages featuring an osprey, blue crab and terrapin as they explore different parts of the site. The pages are samples of a larger coloring book designed by local artist Ellen C. Halbert. Info visitstmarysmd.com/blog/online-museum-fun.

Tour Maryland parks

Learn about history, nature highlights, Harriet Tubman's life, corn snakes, wildflower hikes by taking a virtual tour of Maryland's state parks. To view one of 29 videos, web search "MD DNR virtual park tour."

Free streamside buffers

Stream-Link Education is looking for Frederick County residents who own streamside or riverside property on 2+ acres of land and are interested in joining a large-scale reforestation effort to protect the Monocacy River and its tributaries. Stream-Link raises funds through grant awards, corporate sponsorships to take on buffer-planting projects at no cost to landowners and without restrictions (no easement required). Volunteers plant, maintain the forest for at least three years to ensure 85% survival rate. Fill out form at streamlinededucation.org/landowners. Info: streamlinededucation.org/about, 301-473-6844, lisa.streamlink@gmail.com.

Million Acre Challenge

Future Harvest's Million Acre Challenge is working to advance healthy soil on 1 million acres of Maryland farmland. Its website, millionacrechallenge.org, is a hub where farmers, consumers, service providers, researchers, funders can share data on soil health, take action. Site highlights include:

- *Resources*: Peer-reviewed research, articles, reports.
- *Farmer Spotlights*: Learn what others are doing.
- *Ways to Join the Challenge*: Learn how to get involved.

Visit @soilchallenge on all social media platforms for updates. Info: Amanda Cather at amanda@millionacrechallenge.org.

DNR educational resources

The Maryland Department of Natural Resources produces a variety of at-home learning resources on topics ranging from aquatic life and estuaries to fishing tips to environmental tips to "green" your lifestyle. Visit: dnr.maryland.gov/ccs/Pages/At-Home-Learning.aspx.

A forest encounter: the hawk and little bird that got away

STEWARD'S CORNER

By Craig Highfield

Although it was almost 20 years ago, I fondly remember an avian encounter I had in the woods that would alter, I imagine, at least the short-term future of three different species.

I was trekking with a group of high school students, teaching a lesson on forest ecology. I needed to retrieve some materials at our streamside forest site, so I sent the students up the trail with the other teacher toward a stand of mature upland oaks.

At that moment, from the corner of my eye, I saw a gray blur streaking around a couple of American hornbeams, then right past me, then pausing in a fluttering tangle a few feet away. The flurry of feathers diverged into two separate objects that immediately fell to the ground, and I found myself in triangulation with the perpetrators of this commotion: a sharp-shinned hawk (*Accipiter striatus*) and a little brown bird (I'm going to go with *Brownous littleous*). An epic and tense standoff between a predator, its prey and the mysterious character (me).

The impasse only lasted a few seconds before both birds regained self-awareness and bolted in opposite directions. I guess I was perceived as a mutual threat. I stood there for a moment, awestruck by the hawk's agility to weave effortlessly and precisely through those dense woods in pursuit of sustenance. I'm sure the little brown bird went on to regale generations of kin with tales of its narrow escape.

Sharp-shinned hawks are the smallest of three species from the genus *Accipiter* that are native to the United States and Canada. Goshawks (*A. gentilis*) are the largest of the three, followed by the Cooper's hawk (*A. cooperii*).

As with most raptors, sharp-shinned hawk females are the larger gender, roughly the size of a crow. Males are noticeably smaller, closer to the size of a blue jay. They get their name from the sharp, laterally compressed keel-like skin on the front of



Sharp-shin hawks are the smallest of the *Accipiter* genus found in the U.S., easily mistaken for the slightly larger but similarly marked Cooper's hawk. (Kenneth Cole Schneider/CC BY-NC-ND 2.0)

their long skinny legs — though don't expect to see this from any distance.

Sharp-shins are true forest birds. They breed and nest deep in forest interiors. They are perfectly adapted for forest conditions: short round wings and long tails that they use as a rudder to maneuver around trees. Though small in stature, they are stout-hearted when pursuing their prey — smaller songbirds like warblers, sparrows and thrushes, but also occasionally insects, small rodents and reptiles.

They are "pursuit hawks" and prefer using various covers to strike at short distances during flight. Although they nest in the forest interior, they will pursue their prey at the forest edge and even in wooded suburban neighborhoods, where birdfeeders offer the opportunity for a quick meal.

(It's worth noting here that, as much as you may want to protect your beloved feeder birds, you may *not* do so by killing the hawks; they are protected under the federal Migratory Bird Treaty Act. Harming them

will result in a hefty fine. The best way to keep hawks at bay is take down the feeders for a few weeks.)

Known as "variable" migrators, sharp-shins in the Chesapeake Bay region might be year-round residents or short-distance migrators — for example, summering (breeding) in Pennsylvania and wintering in Virginia. Others are long-haulers, breeding in far northern climes and wintering far to the south of us.

They are solitary during the breeding season (late May to early July) and prefer to nest in conifers for cover and protection from predation. The larger females do most, if not all, of the nest construction, while the males ... well, I suppose they strut around and pretend to be in charge. And they hunt, of course.

It's a similar division of labor during incubation, which lasts roughly 30 days, according to the Cornell Lab of Ornithology. The female broods, and the male hunts and delivers prey to the nest.

About a month after hatching, the young start venturing out of the nest to nearby branches. They begin to fly a few weeks later, though the adults continue to feed them, often in midflight. In another few weeks the young are ready to explore and hunt for themselves.

The sharp-shin is quite easily confused with the Cooper's hawk. The two have similar coloring in both immature and mature stages, and the two species occupy similar forest habitats. Further confounding identification, female sharp-shins are often as big as male Cooper's.

The tails can help you distinguish between the two species. Sharp-shins generally have a squared-off tail, while the Cooper's hawk's is longer and more rounded. Sharp-shins also usually have smaller heads in proportion to their wings. Sharp-shins have been described as flying mallets and Cooper's as flying crosses. As with most species of accipiters, they fly in a similar fashion: three to six wing flaps followed by a glide. But the sharp-shin's wing flaps are usually much faster than the Cooper's and difficult to count.

Since my encounter with the sharp-shinned hawk that day, my appreciation for these forest raptors has grown. The species was devastated by the now-banned pesticide DDT but has made a remarkable comeback by adapting to succeed in a changing environment.

Unfortunately, climate change may affect their breeding areas and the ability of nestlings to survive. Rising temperatures could extirpate them from our region as acceptable breeding sites move north.

You can't care for something if you don't know about it. The more we observe and learn about the amazing animals of the Chesapeake Bay watershed, the more we understand the importance of protecting its beauty. And personal interactions, like mine with the hawk, tend to give us the greatest appreciation for our natural places. That appreciation drives us to steward our land and waters, so they remain hospitable for all wildlife for years and centuries to come.

I hope that our efforts to reforest open ground and keep forests from being converted to other land uses will help maintain a livable habitat for the sharp-shinned hawk and its fellow forest inhabitants. ■

Craig Highfield is the forests program director for the Alliance for the Chesapeake Bay.

Watch the water's edge for the Louisiana waterthrush



By Mike Burke

A heavy mist dripped from a slate sky. The early morning landscape reluctantly brightened without revealing the source of illumination. A stream overflowed its banks, slowly flooding the forest floor.

I was feeling as somber as the landscape. A close and much-loved relative had just died. Every day seemed to yield another mass shooting. These immediate troubles occurred against a backdrop of a pandemic and climate change. So I wasn't going to let drizzling heavens deter me from an early morning bird walk, my most effective mental health treatment.

A small, bobbing, brown and white bird appeared through the gray light. It was feeding at the dark water's edge. A long, curving white eyebrow, wider at the back, was the only facial marking. The white throat quickly yielded to a heavily streaked breast. Its entire rear end methodically bobbed up and down.

We were looking at a Louisiana waterthrush (*Parkesia motacilla*). As we inched closer, a second waterthrush appeared not far from the first.

Despite the state-specific name, Louisiana waterthrushes can be seen throughout the eastern United States in spring and summer. And the two we were watching had likely migrated from their winter homes in the Caribbean, Mexico or northern South America.

These were the first waterthrushes recorded in years at the Collington community in Mitchellville, MD, where we live. Imagine our delight when two more of the birds appeared in the flooded wetlands that feed Collington Lake.

Stormwater from surrounding neighborhoods, businesses, roadways and parking lots is directed away from those properties and funneled into the stream leading to the lake.

Large stones inside stacked wire cages, called gabions, form a porous dam just before the stormwater enters the lake. The



Name notwithstanding, the Louisiana waterthrush is neither from nor endemic to Louisiana — and it is a warbler, not a thrush. It can be seen throughout the eastern U.S. in spring and summer. (Kenneth Cole Schneider/CC BY-NC-ND 2.0)

gabions slow the racing water, dissipating its energy. Stormwater forms pools behind the gabions, allowing large amounts of sediment and pollutants to fall to the bottom. The cleaner water seeps through the rocks and enters the lake.

This complex “natural” pollution-filtering system supports a growing community of species. Bottom-dwelling worms, crayfish, hearty underwater grasses and such form the base of the lake's food chain. Kingfishers, herons and osprey hunt for fish. Assorted geese and ducks visit.

The waterthrushes were feeding at the muddy edges of the pooled water. They were after insects, frogs, crayfish and more. Their nonspecialized diet helps them thrive in a constantly changing landscape. Since 1970, Partners in Flight has estimated a 34% increase in the species' population.

The Clean Water Act was passed in 1972 over the veto of President Nixon. It has resulted in widespread improvements in the health of U.S. waters, from lakes and rivers to wetlands and even estuaries like the Chesapeake Bay. In the early years, the EPA and state environmental agencies devoted their attention to sites and facilities discharging large amounts of pollution directly into U.S. waters. Today, the permitting and enforcement focus is on nonpoint source pollution, which reaches waterways from broad swaths of land by seeping into ground-

water or washing across the surface. In the last 25 years, that approach has begun to pay noticeable improvements. The innovative approach at Collington is a good example.

Organisms at the bottom of the food chain are extremely sensitive to pollution of all kinds. Because the Louisiana waterthrush relies on such a broad sampling of these creatures, it is considered an excellent indicator of stream health.

With an expanding population, some waterthrushes are likely looking for new breeding spots. When I saw the birds near our home, I immediately hoped that Collington was under consideration. Perhaps my delight at seeing the birds was running away with me.

Female and male Louisiana waterthrushes cooperatively select a nesting site, then jointly build the nest. Streamside recesses, including those provided by upturned tree roots, are favorite locations.

The female will lay up to six eggs. Only she has a “brood patch,” a featherless area on the belly that allows maximum heat exchange between the mom and incubating chicks. She sits on the eggs 10–14 days before the chicks hatch.

The nestlings grow rapidly, leaving the nest just 9–12 days after emerging from the shell. Both parents tend to the newly fledged young for up to a month. The species generally produces a single brood



The Louisiana waterthrush (shown above) is easily confused with the northern waterthrush. Both species spend most of their time at the water's edge, dining on insects and small vertebrates. (Kenneth Cole Schneider/CC BY-NC-ND 2.0)

annually, from mid-May to mid-June.

The name of the Louisiana waterthrush is doubly deceiving: In addition to being neither from nor endemic to Louisiana, it's also not a thrush. It is classified as a warbler. (So is the look-alike northern waterthrush, which winters farther south and breeds farther north.) Unlike other eastern warblers, the Louisiana waterthrush does not spend its time flitting among the branches of trees large and small. Instead, it is most often found along streams and associated wetlands.

Like other eastern warblers, the water thrush has a beautiful song and migrates annually between North America and the tropics.

This bird is hard to classify but easy to appreciate. Its modest brown and white feather designs are attractive without being flamboyant. Its song is rich and musical. Its constantly bobbing rear end is both amusing and intriguing. And, most importantly, it has just appeared steps away from our apartment.

As I grow older, I better appreciate these tiny gifts that sometimes appear out of life's fog. They brighten my life even in times of darkness. And that makes them easy to classify: a salve to the soul and a lift to the heart. ■

Mike Burke, an amateur naturalist, lives in Mitchellville, MD.

Flashing fireflies add spark of magic to summer nights



By Kathy Reshetiloff

As a child, I loved the magical lights of summer nights. Although the annual Perseid meteor shower provides sky watchers with a wonderful show, the light display that attracted me was closer to the ground: fireflies.

I didn't understand how these tiny insects — which are in fact beetles, not flies — were able to use their bodies to create light. But that didn't matter. Seeing those tiny lights flashing on and off in the neighborhood was enough for me, and it meant summer was in full swing.

Bioluminescence is the process fireflies and other organisms use produce light. It's a chemical reaction involving oxygen, a light-emitting compound known as luciferin and an activating enzyme called luciferase. When the three combine, the result is a pulse of light — in this case in the insect's abdomen.

During June and July, after spending most of the year underground, fireflies emerge to attract a mate. Their lights flash in a specific pattern or code. There are more than 2,000 species of fireflies, with 170 or more in North America, according to the nonprofit organization Firefly Conservation & Research, aka Firefly.org. Each species has its own light code. For most species, the males fly while flashing their code. Females, usually on the ground, will flash the same code back. The male then joins the female on the ground, where they mate.

The most prevalent species in the eastern U.S., according to Firefly.org, is *Photinus pyralis*, the common eastern firefly. But multiple species are known to share habitats, so the light show in your backyard might be a collaborative affair.

Fireflies are critical to a healthy ecosystem for their roles as both predator and prey. As larvae, fireflies are carnivorous, eating a variety of invertebrates, including significantly larger ones like snails, slugs and earthworms, which they disable by



injecting an immobilizing venom. Some species of slugs and snails are harmful to the roots of plants, so fireflies are beneficial to small gardens and large farms.

The diet of adult fireflies depends on the species. The scientific consensus seems to be that, in most species, the adults do not eat at all. That stage of life has the sole purpose of mating and producing eggs and is comparatively very brief — a matter of three to four weeks, compared to the larval stage of one or two years. Nevertheless, the adults of some species eat nectar and pollen. Others are carnivorous, eating mostly other fireflies.

Cannibalism aside, the insect has limited appeal as prey. Most firefly species have chemicals in their bodies that make them toxic or unappetizing to many animals, such as birds, toads and lizards. Still, some spiders and non-firefly insects do prey on them.

In the past, fireflies played an important role in medical research. Researchers have used luciferase to view interactions within cells, leading to advances in detecting blood clots and understanding HIV transmission and diseases like Parkinson's. It was also used to tag cancer cells and reveal contamination in milk and foods by lighting up certain microbes. Fireflies were once collected for their luciferase until

Above: Fireflies light up the woods. With the common eastern firefly, those in flight are generally the males, signaling to prospective mates in the grass or other vegetation. (Fred Huang/CC BY-NC 2.0)

Inset left: A firefly's "cold light" is produced by the interaction of oxygen with the compound luciferin and the enzyme luciferase. (theloushe/CC BY-NC-ND 2.0)

Inset right: This common eastern firefly was photographed in Washington, DC. (Katja Schulz/CC BY 2.0)

a synthetic version created in the 1980s eliminated the need to harvest them.

Because of their bioluminescent flashing, fireflies are aesthetically pleasing and one of the first wildlife species that many children recognize and interact with. They do not sting or bite (at least not us) and pose no threat to crops or gardens. Fireflies live in a variety of habitats, including lawns, damp meadows, irrigated fields, marshes and woodlands. By conserving or restoring habitats that support fireflies, we help support other wildlife, too, making the firefly an important flagship species.

Despite their benefits to people and other wildlife, there is evidence that many firefly species are declining, likely from a combination of habitat loss, light pollution, pesticides, introduced and invasive species and climate change. But there are ways for each of us to help conserve fireflies.

Fireflies need just a few basics to survive: food, shelter, moisture, darkness and protection from pesticides. If you have even a small yard, you can easily provide such things. Here are some tips:

- Don't get rid of snails, slugs and worms. Fireflies need these as a food source.

- Provide a clean source of water and native vegetation of varying heights, from grasses and flowering plants to shrubs and trees.
- Leave some leaves and rotting wood on the ground. These provide protection for larvae.
- Avoid or minimize tilling and other ground-disturbing activities. Any given cubic foot of soil could contain hundreds of firefly larvae.
- Reduce or eliminate your use of pesticides. Fireflies are not harmful to gardens. In fact, they can be beneficial by eating underground root feeders like grubs.
- Turn off unnecessary outdoor lights. Fireflies are active at dusk and night. Light pollution makes it harder for them to signal and find each other to mate.
- Consider joining a community science program like iNaturalist or Firefly Watch to help scientists monitor firefly populations.

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