

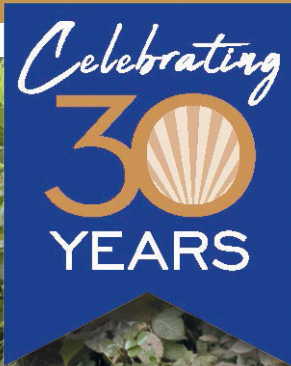
CHESAPEAKE

BAY JOURNAL

October 2021

Volume 31 Number 7

Independent environmental news for the Chesapeake region



Eels in the Susquehanna: A surprising success story

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A VANISHING MARSH BIRD



Biologists check in on the saltmarsh sparrow **PAGE 24**

SHENANDOAH WATER WOES



Algae blooms left West Branch closed to recreation **PAGE 13**

POLLUTION VIOLATIONS



Problems revealed at Baltimore wastewater plants **PAGE 16**

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Nodding beggartick flowers bloom near the Conejohela Flats in the lower Susquehanna River. See article, page 34. (Dave Harp)

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EDITOR'S NOTE



A special report to our readers

Once again, we are happy to share a new issue with you, packed with news — both good and bad — about the vital, ongoing work to improve our shared environment in the Chesapeake Bay region. As you turn the pages, you'll discover how scientists have steadfastly worked through the years to restore eels to the Susquehanna River. You'll learn how Pennsylvania is mounting a fresh attack on nonnative species that disrupt local ecosystems, how Virginia is coping with algae blooms in the Shenandoah River basin and how Maryland is grappling with issues of environmental injustice. Fans of freshwater mussels are calling for more research, hopeful that the bivalves will boost the cleanup of rivers upstream of the Bay.

Admittedly, in many ways, these reports are more important than the one I'm about to highlight here: the *Bay Journal's* 2020 annual report. We mailed the annual report to our readers in September and, if the U.S. Post Office has done its part, most if not all of you should have received it by now. You can also read the report online at our website, BayJournal.com.

I hope you'll take a few minutes to browse its pages. It's not breaking news, of course. But it helps share important messages about the *Bay Journal* and the work of our small team. This year is a special edition, celebrating our 30th anniversary and looking at our long history in service to the people who care so much about our region's natural resources.

As a nonprofit news organization, we depend almost entirely on support from grants and donations, along with a small bit of advertising revenue. We are committed to being excellent stewards of those donated dollars, delivering free journalism as a public service in hopes that everyone can be engaged with charting the way toward clean air and clean water for all.

If you are among those who can support this mission with a donation, we are truly grateful. And remember, one of the most helpful things you can do is to share the *Bay Journal* with someone who hasn't yet heard of it!

— Lara Lutz

ON THE COVER

Biologists from the U.S. Fish and Wildlife Service search for eels on Pennsylvania's Buffalo Creek. Sheila Eyler sends an electric shock into the water while Josh Newhard is ready to catch any stunned eel and place it in a bucket. (Dave Harp)

Bottom photos, left and right: Dave Harp

Bottom photo, center: Alan Lehman/ Shenandoah Riverkeeper

bayjournal.com

BY THE numbers

29

Species of waterfowl that reside around the Bay at least part of the year

30

Years, the longest documented lifespan of a wild Canada goose

12

Years in the average life span of a wild Canada goose

46

Percent of Bay watershed residents who say they never use toxic pesticides

84

Percent of river habitat along the U.S. Coast where fish migration is impeded to some degree by dams

15,115

Estimated number of dams on rivers along the U.S. East Coast

41

Inches of sea level rise anticipated near Hampton Roads, VA, by 2100

Amazing journeys on the Atlantic Flyway

As fall begins, it brings with it the opportunity to witness a spectacular event: bird migration. In the Chesapeake region, most of these birds are following the Atlantic Flyway, an aerial highway that carries millions of birds as they migrate from their summer breeding grounds to wintering locations. The route stretches from Greenland and the Canadian Arctic to Tierra del Fuego at the southernmost point of South America. Its route hugs the shoreline near much of the East Coast, because it is mostly free of mountains. Most of the migrating birds either pass over or stop in the Chesapeake Bay region.



About the flyway

- More than 500 species of birds use the Atlantic Flyway.
- More than 250 species that use the flyway pass through the Blackwater National Wildlife Refuge near the Chesapeake Bay.
- Most birds travel only a small portion of the entire flyway.
- Some species, such as the endangered red knot — which can be seen stopping along the Atlantic Coast of Delaware, Maryland and Virginia — fly the entire route twice a year, a round trip of more than 18,000 miles.
- Not all of the birds that use the flyway make stops. The blackpoll warbler, which can be found in the northern part of the watershed, flies 1,800 miles nonstop over the water during its migration, which can take 88 hours.
- The Chesapeake is the final stop for many waterfowl that breed in Canada but spend their winters in a warmer climate. More than half a million Canada geese spend their winter on the Eastern Shore.

Snow geese take flight at the Blackwater National Wildlife Refuge on Maryland's Eastern Shore. (Dave Harp)

LOOKING BACK



30 years ago

'Green' groups get mixed reviews

An analysis by the University of Maryland of nearly 200 environmental organizations in the state found that the groups had achieved some short-term successes but suffered from the lack of long-term vision. ■

— *Bay Journal, October 1991*

20 years ago

VA launches Office for Environmental Education

Virginia announced its new Office for Environmental Education within the state Department of Environmental Quality, aiming to increase environmental literacy and promote life-long learning about the environment. ■

— *Bay Journal, October 2001*

10 years ago

Severe storms pummel Bay region

Hurricane Irene and Tropical Storm Lee hit the Bay region within two weeks of each other. They scoured the land with flood waters, dumping a wide range of pollutants into waterways and leaving a trail of debris in their wake. ■

— *Bay Journal, October 2011*

ABOUT US

The *Chesapeake Bay Journal* is published by Bay Journal Media, an independent nonprofit news organization dedicated to producing journalism that informs the public about environmental issues in the Chesapeake Bay watershed. The *Bay Journal* is available in print and by email and is distributed free of charge, reaching approximately 100,000 readers each month. The print edition is published 10 times a year, and bundles are available for distribution at offices, libraries, schools, etc. Material may be reproduced, with permission and attribution.

Bay Journal Media also operates the Bay Journal News Service, which distributes *Bay Journal* articles and op-eds about the Chesapeake Bay and regional environmental issues to more than 400 newspapers in the region.

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Beavers steal the show in the Bay Journal's new film, *Water's Way: Thinking Like a Watershed*, by Dave Harp, Tom Horton and Sandy Cannon-Brown. (Dave Harp)

New Bay Journal film: *Water's Way*

The *Bay Journal* is proud to sponsor yet another environmental film, which premiered Oct. 1 in Easton, MD, and is now available on the *Bay Journal* website. *Water's Way: Thinking Like a Watershed* is the latest from the film-making trio of Dave Harp, Tom Horton and Sandy Cannon-Brown.

For this, their fifth film, they delve into the natural history of the Chesapeake Bay to explore how, before Europeans arrived, the untamed watershed helped sustain the region's water quality and abundant life — and how it might do so again.

Water's Way features insights from noted paleoecologist Grace Brush and other experts. But the production could just as easily have been called *Leave it to Beavers*, because the industrious semi-aquatic rodents steal the show. The ponds and wetlands they create capture rainfall runoff and keep harmful nutrients and sediment out of the Bay and its tributaries.

"If we could emulate beavers," Harp noted, "that would go a long way to restoring the Bay."

Stars or not, it was no easy feat getting the wary creatures on camera. Horton said he and Harp hauled a downed beech tree close to one beaver lodge, with hopes that it would draw them into the open so they could be more easily filmed. "The next morning, that damned thing looked like a toothpick," Horton said. And they had a few hours of beaver footage from which to draw.

You can watch the 45-minute film by visiting bayjournal.com/films or by visiting our YouTube channel (when searching for it through your web browser, be sure to enter the full phrase "Chesapeake Bay Journal YouTube" into the search window).

And if you need more environmental ideas to ponder, check out our new podcast, *Chesapeake Uncharted*. The first season is about climate change in the Bay region. A new episode is released about every two weeks. Tune in through ChesapeakeUncharted.com, on your favorite podcast service or by visiting BayJournal.com/podcasts.

— Timothy B. Wheeler

PA climate plan calls for more renewables

Pennsylvania's latest climate action plan calls for immediate steps to reduce greenhouse gases to head off the worst effects of climate change.

The report, released Sept. 22, takes a more urgent tone than previous ones and says climate change is already intensifying floods, droughts and extreme weather. That is threatening everything from public health, agriculture, basic infrastructure, recreation and the environment.

The average daily temperature in the state has risen 2 degrees, mostly in the last 20 years, and could rise another 5.9 degrees by 2050 or so.

The strategy focuses on moving to a carbon-free electrical grid with more renewable energy, electric vehicles, nuclear power and more energy-efficient buildings, along with a reduction of carbon emissions from industries.

Most of the steps can be implemented in the next 5-10 years — enabling Pennsylvania to reach Gov. Tom Wolf's goal, announced in 2019, to cut carbon emissions in the state 26% by 2025 and 80% by 2050.

But environmental groups immediately attacked



Pennsylvania ranks second in the nation for natural gas output. (Rona Kobell / 2011)

the plan because it does not call for moving away from natural gas production in the state, which ranks second highest in the nation for natural gas output.

"We cannot expect to meet these bold emissions reduction goals while still relying on dirty energy for economic growth," said Jacquelyn Bonomo, president of PennFuture.

"Pennsylvanians must accept the hard truth that we must transition as soon as possible from fossil fuels, including fracked gas, as the way forward to achieve carbon neutrality."

The plan calls on the state legislature to amend a state law to require more electricity consumed in Pennsylvania to come from renewable sources.

New in the latest plan are calls to protect mainly urban communities of color and low-income from health-threatening pollution. ■

Bay Program sets detailed course for diversity, inclusion

The state-federal partnership overseeing the Chesapeake Bay cleanup has released more details on how it plans to increase diversity and inclusion within its own ranks and combat racial disparities in its work.

The 25-page plan, published on Aug. 23, offers a roadmap for meeting the Chesapeake Bay Program's "diversity, equity, inclusion and justice" goals, officials say.

The plan comes nearly a year to the day after

See BRIEFS, page 6

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briefs

From page 5

the Chesapeake Executive Council formally agreed to collectively pursue greater diversity and inclusion. The policy was unanimously signed by the council's membership: the governors of Maryland, Virginia, Pennsylvania, Delaware, New York and West Virginia; the mayor of the District of Columbia; the head of the Chesapeake Bay Commission, which consists of legislators from Bay states; and the administrator of the U.S. Environmental Protection Agency.

The new document, drafted by the Bay Program's Diversity Workgroup, lays out what officials say needs to happen next.

The overarching priorities are to weave diversity language into the program's governance documents, increase diversity among staff and leadership and incorporate the aspirations of underrepresented communities into decisions. The Bay Program is also seeking to bring nonprofits and other partners into the mix by requiring proof of environmental justice considerations from grant recipients.

Among other actions called for in the report:

- Use entry-level positions, such as the Chesapeake Conservation Corps, as a pool of potential diverse candidates for permanent positions within the partnership.

- Develop a list of organizations led by or serving underrepresented communities.
- Track grant allocations to organizations with an environmental justice focus.
- Review communication materials to identify areas for improvement.

The workgroup's plan sets a 2025 deadline or sooner for virtually all of the proposed actions. But the plan isn't set in stone yet. The Bay Program was collecting public feedback on the plan through Sept. 27. ■

Bay's Latino voters express concern about environment

A recent survey has found strong support among Latino voters for environmental issues, including actions that would help protect the Chesapeake Bay, address climate change and increase access to the region's waterways.

The survey, commissioned by the Hispanic Access Foundation and Chesapeake Conservancy, polled 900 registered voters — 178 of whom identified as Latino — in Delaware, Maryland, the District of Columbia and Virginia.

Among the Latinos surveyed, approximately 94% believe that investments are needed to protect land, water and wildlife. They view climate change and water pollution as the most pressing environmental issues.

"Latinos living by the Chesapeake Bay are continuing to show their strong support for climate



Carlos Sanchez-Gonzalez, the 2020 recipient of the Youth Environmental Champion award from the Audubon Naturalist Society, is a young environmental activist in Baltimore. (Dave Harp)

action and concern [about] environmental issues affecting their local communities," said Maite Arce, president and CEO of the Hispanic Access Foundation. "Whether it's ensuring we protect clean water, air quality and wildlife habitats or providing opportunities for communities of color to visit and recreate on our national public lands and water, this poll provides a clear message for the state's leaders." The poll also revealed strong support among

Latinos for land conservation and creating more equity within those efforts.

Approximately 92% of the Latinos surveyed support setting a goal of conserving 30% of the country's land and waters by 2030, and 84% percent support creating a Chesapeake National Recreation Area. Ninety-three percent support funding to ensure that lower-income people and communities of color have adequate access to parks and natural areas in the Bay region.

Eighty-three percent of the Latinos polled support a full transition to cleaner, renewable energy sources like solar, wind and hydropower over the next 10 to 15 years. ■

Update: EPA proposes cleanup Bear Creek

The U.S. Environmental Protection Agency is taking public comments on its proposal to use federal funds to deal with contaminated sediments in Bear Creek near Baltimore, the toxic legacy of decades of steelmaking and shipbuilding onshore at Sparrows Point.

On Sept. 8, the EPA proposed placing the creek, a tributary of the Patapsco River, on the National Priorities List, which would make it eligible for remedial action under the federal Superfund program.

The agency estimates that at least 60 acres of the creek bottom contain toxic metals and organic chemicals, including arsenic, chromium, PCBs and

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briefs

polycyclic aromatic hydrocarbons.

Sparrows Point, a 2-mile-wide neck of land separating Bear Creek and Old Road Bay near the mouth of the Patapsco, was a vast steelmaking and shipbuilding complex from the late 1800s until 2012, when the mill once owned by Bethlehem Steel Corp. closed.

Under a consent agreement, the heavily contaminated 3,100-acre peninsula is being cleaned up by Tradepoint Atlantic, the company redeveloping the site. But its responsibility for dealing with offshore contamination is limited by the terms of Bethlehem Steel's bankruptcy.

Residents of the Dundalk area across Bear Creek, including the historic African American community of Turner Station, use the creek for boating, fishing and crabbing, which has raised human health concerns.

The 60-day comment period on the creek's proposed Superfund listing ends Nov. 8. Comments may be filed online by visiting regulations.gov and searching for EPA-HQ-OLEM-2021-0458, then clicking on the Dockets tab at the top of the page.

They can also be submitted by mail to the U.S. Environmental Protection Agency, EPA Docket Center, Docket # EPA-HQ-OLEM-2021-0458, Mailcode 28221T, 1200 Pennsylvania Ave. NW, Washington, DC 20460. ■



The historic African American community of Turner Station is seen here from the south side of Clement Cove, across Bear Creek from the former site of the Bethlehem Steel mill on Sparrows Point. (Dave Harp)

Update: Comments sought for Harford County, MD, project

Opponents of a development that would bulldoze woodlands near the head of the Chesapeake Bay have another chance to speak out.

The Maryland Department of the Environment is taking public comments until Oct. 15 on a permit it

had previously granted for a business park to be built on a wooded 330-acre tract in Harford County.

The move comes after a Harford County Circuit Court judge sent back the permit, which would allow the developer to build across streams and impact wetlands at the site. Abingdon Woods, as locals call it, is one of the last sizable forest tracts in a heavily developed area near the Bush

River, a Bay tributary. The developer's plan is to clear 220 acres, or two-thirds of the woodlands, to build warehouses, a hotel and other commercial buildings.

The Gunpowder Riverkeeper and some area residents had filed the suit challenging the MDE permit, arguing that regulators had not given them a chance to comment on key information that regulators had relied on.

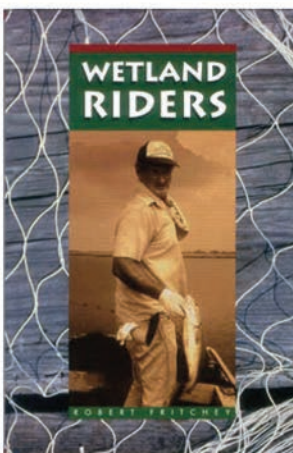
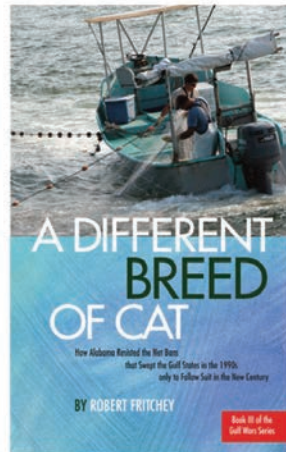
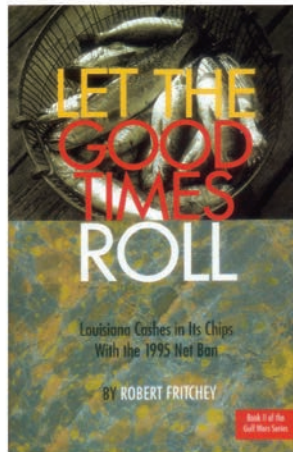
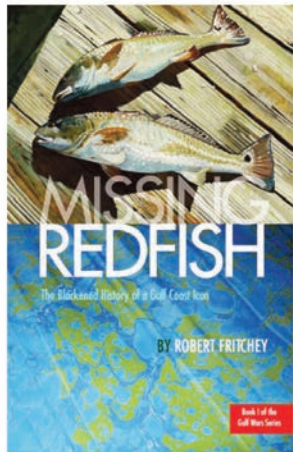
Judge Diane Adkins-Tobin agreed that some analyses were not made available to the public in time for them to review and pose objections. She put a hold on the permit and ordered the MDE to invite and consider public comment.

Chesapeake Real Estate Group, the developer at that time, maintained that the wooded tract in Abingdon, next to Interstate 95, is the only suitable site in the area for a distribution complex. Earlier this year, that company sold its interest in the project to BTC III I-95 Logistics Center LLC, which continues to pursue it.

The project's opponents noted that there were 18 vacant warehouses in the region.

For information on the permit, visit mde.maryland.gov and search for "Abingdon Business Park permit."

You can email written comments by Oct. 15 to jeffrey.thompson@maryland.gov or mail them to the MDE, Attn: Jeffrey Thompson, 1800 Washington Blvd., Baltimore, MD 21230. ■



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New hearings set for large MD Eastern Shore development

MDE, Talbot County revisit questions on Trappe wastewater permit

By Timothy B. Wheeler

Maryland residents concerned about the water-quality impacts of a large housing and commercial development on the Eastern Shore have three new opportunities in October to share their opinions with decision makers.

The Maryland Department of the Environment has scheduled a public hearing Oct. 28 on its plan to permit treated wastewater from a planned development in Trappe, called Lakeside, to be sprayed on nearby farm fields. It will take place, in person, at the Talbot County Community Center and Curling Rink, at 10028 Ocean Gateway in Easton.

Talbot County's council and planning commission, meanwhile, plan to hold hearings of their own before the MDE session to revisit their 2020 votes in support of the project.

The MDE had issued a groundwater discharge permit in December 2020 for the proposed community of 2,501 homes and apartments plus a shopping center, to be built on an 860-acre tract annexed nearly two decades ago by the town of Trappe. Earlier this year, though, a Talbot County judge ordered the department to give the public another opportunity to comment on the permit because of changes made in it before being issued.

The MDE's permit would allow the developer to eventually spray an average of 540,000 gallons of wastewater daily on grassy fields. It must be treated using enhanced nutrient removal to lower the levels of nitrogen and phosphorus. A lagoon is also required to store wastewater for up to 75 days during winter and when it's raining or too windy to spray.

Neighboring residents and environmental groups have questioned the MDE's assurances that nutrients and other contaminants in the wastewater would be soaked up by the grass in the fields. They fear it could seep into groundwater or run off into nearby Miles Creek, a tributary of the Choptank River. In addition to

Residents and environmental groups have questioned the MDE's assurances that the nutrients and other contaminants in the wastewater would be soaked up by the grass.

in-person comments at the hearing, the MDE will consider written comments submitted by Nov. 5. Those should be emailed to mary.dewa@maryland.gov or mailed to Mary Dela Onyemaechi, Chief, Groundwater Discharge Permits Division, Maryland Department of the Environment, Water and Science Administration, 1800 Washington Blvd., Baltimore, MD 21230-1708.

Project opponents have gathered about 200 signatures on a petition calling on the Talbot County Council to rescind its 2020 resolution in support of the development. The resolution amended the county's water

and sewer plan to include Lakeside, which effectively cleared the way for the MDE to issue its permit.

Opponents say the council should withdraw its backing, particularly because of changes the developer has made since then in how Lakeside's wastewater will be handled. The first 89 homes in the development, already under construction, are to have their sewage piped to Trappe's wastewater treatment plant. That plant discharges into LaTrappe Creek, a Choptank River tributary already impaired by excessive nutrient pollution.

When the Talbot County Planning Commission meets at 9 a.m. on Oct. 6, it will discuss whether to rescind its 3-2 vote in 2020 recommending that the council support the Lakeside project. The council will meet in the Bradley room at the Talbot County Courthouse and take comments from the public.

The County Council hearing takes place at 6:30 p.m. Oct. 12 at the Talbot County Courthouse at 11 N. Washington St. in Easton. ■



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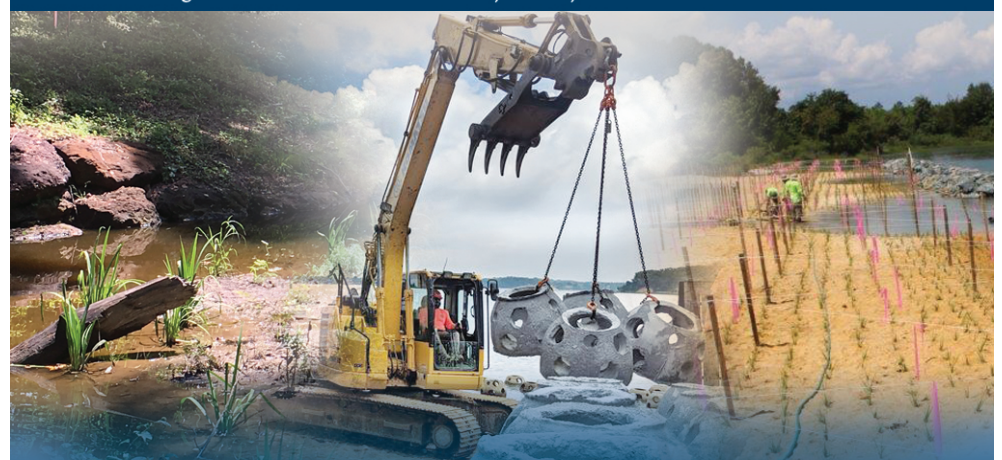
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Judge tosses rule that reduced protections for streams, wetlands

Decision still leaves these waters in regulatory limbo

By Jeremy Cox

A federal judge in Arizona has thrown out the Trump administration's 2020 rollback of a federal law designed to protect rivers, streams and wetlands.

But the ruling by U.S. District Judge Rosemary Marquez, an Obama appointee, leaves those waters in regulatory limbo. For now, the U.S. Army Corps of Engineers and U.S. Environmental Protection Agency will take their cues from a law that went into effect in 1986, a regulation widely panned as byzantine and confusing.

Farmers and developers strongly supported the Trump administration's changes, which drastically narrowed the definition of "waters of the United States." As a result, federal protections no longer applied to an estimated 18% of streams and more than half of the nation's wetlands.

The pushback from environmentalists

was swift. Among those in the Chesapeake Bay region who filed court action against the Trump rule were the Chesapeake Bay Foundation, Friends of the Rappahannock, James River Association, ShoreRivers, and Southern Environmental Law Center.

And a coalition of 19 states and localities, including Maryland, Virginia, New York and the District of Columbia, joined a suit in federal court in California seeking to have the new rule set aside. In a separate suit, the Arizona case was led by the group Earthjustice on behalf of the Pascua Yaqui Tribe and other tribes.

In her ruling, Marquez signaled that she might be open to letting the 2015 Obama administration revision stand instead of the 1986 language. She asked the two sides to submit arguments on the issue, according to *E&E News*.

The Arizona ruling applies to jurisdictions nationwide. But it is unclear how long it will stand. The U.S. Supreme Court is likely to be the arbiter.

Meanwhile, the Biden administration is also working to redefine "waters of the United States." That process is expected to take months, if not years. ■



Amy Jacobs of The Nature Conservancy's Maryland/DC chapter stands in a Delmarva bay in Dorchester County, MD. Such waters were left unprotected by the Trump administration's redefinition of "waters of the United States." (Dave Harp)

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Reporting points to difficulties in clean water fight

By Karl Blankenship

The Bay Journal was first published 30 years ago, in March 1991. This column is part of a series marking the Bay Journal's 30th anniversary, highlighting its coverage, its unique development as a nonprofit news source and our plans to continue serving readers in the years to come.

In the last two issues of the *Bay Journal*, I reviewed lessons about the Chesapeake Bay restoration gleaned from our first two decades of reporting. Reviewing our third decade is more challenging. Issues multiplied, grew complex and often went to court.

Here is a sampling of some of the high and low points of the last decade, as viewed through some select *Bay Journal* headlines.

TMDL challenges

The Chesapeake Bay total maximum daily load, which set pollution limits for states in the watershed and guides cleanup efforts, was quickly challenged in court and in Congress: *Congress, farm community say EPA overreached with TMDL* (April 2011). The issue dragged on for years until opponents lost decisively: *Circuit Court upholds EPA's authority to issue Bay TMDL* (September 2015). The court called the challenge "long on swagger but short on specificity." The Supreme Court refused to hear the case.

Going big with oysters

After dabbling with oyster restoration for decades, often with poor results, the effort went big on a Choptank River tributary: *Harris Creek reef restoration at 350 acres, is largest ever* (October 2015). With indications that the large-scale approach offered a blueprint for success, the region went on to identify 9 more areas for such projects.

TMDL goals come up short

While the TMDL survived legal challenges, it proved less successful in accelerating cleanup efforts: *Region not on track to make nitrogen reduction goals* (May 2015). The shortfall was driven in large part by Pennsylvania, where reductions depend mainly on agricultural sources. In 2019, though, updated plans showed that Maryland and Virginia, as well as Pennsylvania, must reduce agricultural runoff at a pace they've never achieved: *New state plans reveal tough path to 2025 cleanup goals* (May 2019). Spoiler alert — Meeting those goals is unlikely: *Missed again?* (September 2020).



The relicensing of the Conowingo Dam on the Susquehanna River became an enormous issue during the most recent decade of Bay Journal reporting. (Dave Harp)

In need of streamside buffers

Planting streamside forest buffers has been a key method for restoring the Bay and its rivers for 25 years, but plantings have stalled. We flagged the issue: *Riparian buffer goal falling by the wayside* (March 2014). Four years later, the situation was the same: *States lagging badly in planting streamside trees* (April 2018).

Getting the blues over catfish

The blue catfish, a native of the Mississippi basin, was introduced in Virginia in the 1970s. It became a regional concern in the last decade as scientists and some fishery managers worried their growing numbers could alter river biology: *Blue catfish boom threatens region's river ecosystems* (May 2011). Low salinities resulting from protracted rain in late 2018 and early 2019 likely allowed the fish, which likes fresh and brackish water, to spread farther: *Biologists fear catfish spread after last year's record deluge* (June 2019).

Water, above and below

Climate change has been bringing more rain and intense storms to the region, sometimes with deadly results: *When it rains, it pours in Ellicott City* (March 2018). The region as a whole was repeatedly inundated by rain in 2018 and 2019, threatening Bay cleanup progress: *Washed away? Torrential rains threaten Bay restoration gains* (September 2018). Rising

sea levels are a problem, too. It enters groundwater, ruining nearshore farmland: *Saltwater intrusion laying waste to Delmarva farms as sea level rises* (March 2019). It drowns wetland habitat critical for many species: *USFWS adds black rails to 'threatened' list* (Nov. 2020). And it began causing flooding on days with no rain: *'Sunny day' flooding on the rise along the Chesapeake* (September 2020). Sadly, it's going to get worse: *MD sea level to increase dramatically, report says* (January–February 2019).

Surprising sturgeon science

Sturgeon live mostly in the ocean and spawn in rivers during — it was thought — the spring, like other anadromous species. So it was a surprise when biologists found one ready to spawn in late summer: *Female sturgeon caught in James suggests fall spawning run* (October 2011). A West Coast scientist called to say people here were crazy if they thought such a thing could happen. But the finding was confirmed: *Sturgeon study on tidal James offers evidence of fall spawn* (November 2013). In fact, although the Atlantic sturgeon was listed as endangered in 2012, the big fish are turning up all around the Chesapeake: *Atlantic sturgeon back in Bay, or did they ever leave?* (December 2014).

Conowingo conundrum

We reported early in the decade that the pending relicensing for Conowingo Dam

on the Susquehanna River would be a big deal: *Relicensing of Conowingo Dam an opportunity for many Bay issues* (January–February 2013). The dam affects migrating fish, water quality, downstream habitats and more. It became more significant when scientists reported it was no longer trapping sediment, allowing more pollution to reach the Bay. The question of whether that was the responsibility of Exelon Corp., which owns the dam, or upstream sources responsible for pollution, sparked debate and lawsuits. Ultimately, Maryland and the utility reached an agreement that allowed a 50-year operating license to go forward and addressed many issues: *Exelon, MD reach \$200 million settlement for impact of Conowingo Dam* (December 2019). But the agreement does not resolve the pollution problem, and the question of who will pay for the cleanup remains.

A plague of plastics

It's long been known that plastics persist in the environment, but recent research has shown that plastic disintegrates into tiny, unseen particles that are ingested by fish and humans and have a range of other impacts: *Invisible microplastics a threat to bottom of marine food web* (May 2013). They're drawing increased attention, including that of the state-federal Chesapeake Bay Program. The problem is not going away: *Death by plastic: Bay's marine mammals, sea turtles imperiled by growing debris* (December 2020).

Forever chemicals

Plastics aren't the only thing not going away. There's growing worry about PFAS, or "forever chemicals" because of their persistence in the environment. States are scrambling to deal with the problem: *Some states act to treat PFAS turning up in drinking water in the watershed* (July–August 2019). And the more people look, the more they find: *'Forever chemicals' found in freshwater fish* (September 2020). ■

Overhaul planned for two branches of the Anacostia River

Opening fish passage, improving habitat helps basinwide restoration

By Whitney Pipkin

Federal and local governments are preparing to spend an estimated \$34 million on stream restorations in two branches of the Anacostia River, which flows from Maryland headwaters into the District of Columbia. After years of planning, construction is scheduled to begin in the fall of 2022.

The U.S. Army Corps of Engineers split the \$1.8 million study costs for the project with Prince George's County, MD, where the work will occur. The majority of the

federal funds approved by Congress for the project will be funneled through the Corps' Baltimore District.

The work will restore 7 miles of stream habitat in the river's Northwest and Northeast branches. Removing blockages to fish passage will open up 4 miles of stream for species such as alewife and blueback herring to spawn and connect them to 14 miles of previously restored stream reaches.

"One of the major features of this project is [that it will] link all of those previous efforts and open up a larger corridor of restored streams, so the fish can travel farther upstream," said Tham Saravanapavan, a project manager for the U.S. Army Corps of Engineers.

The \$34 million expected to be spent on these second- and third-order streams

encompasses about six major projects made possible by decades of collaboration between federal, state and local governments and other partners. They are some of the larger projects among the 3,000 that were first proposed for the river in an expansive 2010 *Anacostia Restoration Plan*.

"The Anacostia River will never again be the pristine river watershed it was before development and urbanization," the introduction to the 163-page plan states. "However, the watershed can and should be restored and protected to achieve environmental and ecological function and sustainability."

Work to improve the Anacostia, which runs through populous Maryland counties and the District of Columbia into the Potomac River, began in earnest, like many clean water initiatives, in the 1970s. Lawmakers and local residents could no longer ignore the impact of "converting the natural landscape into an impervious, manmade landscape," as Saravanapavan put it.

Since then, millions of dollars have gone toward retrofitting wastewater and sewer systems, reducing impervious surfaces and improving habitats in and around the river. Among the next major steps in the mainstem of the river is removing toxic sediment from the river bottom, where industrial pollution along its banks has left a legacy of contamination.

Chris Williams, CEO of the Anacostia Watershed Society, said stream restoration work in the upper reaches is an important piece of that big-picture puzzle. And, after decades of laying the groundwork, many of those major projects, such as toxics remediation, will be coming online around the same time.

"In order to make sure that the Anacostia system is top-to-bottom restored, you need to not only work in the mainstem but also in these tributaries that are sources of new pollutants," he said.

If unrestored, upland streams can contribute excess nutrient and sediment pollution to the river. Gushes of stormwater from surrounding developed areas scour dirt away from stream banks and send it downstream. Reducing some of those hardened surfaces and adding rain gardens and retention ponds can reduce flows to waterways. That work, called best management practices or BMPs, has been under way for years in Prince George's County.

"Upland BMPs are instrumental to anything that is done with the receiving waters," said Frank Galosi, design section



A dragonfly alights on foliage along the headwaters of the Anacostia River. (Dave Harp)



The Good Hope, pictured here, is a Maryland stream in the Anacostia River basin that, at least in recent years, has been a spawning ground for brown trout. The stream flows into Paint Branch, which is slated for extensive restoration work in the coming years. (Dave Harp)

head at the county's Department of the Environment. "All that is collectively needed to address the issues. It's all connected."

Many of the smaller streams that feed the sections involved in this project have been previously restored. This effort will carry those benefits farther downstream to second- and third-order streams that are wider and often faster flowing — making the work more difficult. That is one of the factors driving the project's cost, along with the sheer scale of the work, Galosi said.

The project will entail moving or working around infrastructure that blocks fish from traveling upstream, including old utility crossings and culverts. Removing blockages in the Northwest Branch and along Sligo Creek will increase access for alewife and blueback herring from about 20% of their historic habitat range to about 80%. In the Northeast Branch, those improvements will allow the fish to reach 90% of their historic range, compared with 10% currently.

Williams of the Anacostia Watershed Society said the work will benefit not just the fish but also the people who call this region home.

"These are urban streams," he said, "but they are increasingly becoming an important part of the landscape to improve the livability of towns and communities." ■

Tayloe Murphy, a champion of Virginia's environment, dies

'Quiet giant' a driving force behind Water Quality Improvement Act

By Karl Blankenship

William Tayloe Murphy, Jr., a towering figure in Virginia's environmental protection efforts who spearheaded the passage of numerous pieces of landmark environmental legislation, died Sept. 15. He was 88.

Murphy — widely known simply as Tayloe — was an attorney who represented a district in his native Northern Neck from 1982 to 2000, during which time he worked on nearly every piece of significant environmental bill that passed.

Among the legislation he championed were the Water Quality Improvement Act, which required 10% of any state surplus be used to benefit water quality; the Chesapeake Bay Preservation Act, which increased oversight of land use decisions in areas near the Bay; and restrictions on oil drilling in the Bay.

Murphy later served as Secretary of Natural Resources in the administration of Gov. Mark Warner, where he launched measures to require that nutrient discharge limits be incorporated into wastewater permits and worked to significantly increase spending on clean water programs.

"Virginia has lost a quiet giant in Tayloe Murphy," said Virginia Gov. Ralph Northam. "Our waters are cleaner today because of the Chesapeake Bay Preservation Act, the Water Quality Improvement Fund and all [of] his work in the legislature and as Secretary of Natural Resources."

For Murphy, Bay issues were close to home. He lived on a farm overlooking the Potomac River, and shortly after being elected to the General Assembly he was appointed to serve on the Chesapeake Bay Commission, an advisory panel made up of legislators from Virginia, Maryland and Pennsylvania.

While on the commission, he was involved with issues such as the management of striped bass in the 1980s and blue crabs in the 1990s. He successfully led the commission's efforts to enact a phosphate detergent ban in Virginia.

Murphy was soft-spoken, known for wearing bow ties and frequently described as a quintessential Southern gentleman. He promoted civility among colleagues and



Tayloe Murphy of Virginia, a passionate environmental advocate for the state and Chesapeake Bay region, speaks during a 2019 meeting of the Chesapeake Bay Commission. (Dave Harp)

coworkers, decried rising partisanship and stressed the importance of trying to listen to opponents on issues.

"He would always say in a negotiation that you can get much further with sweetness than you can with acid," said Ann Swanson, executive director of the Bay Commission. "He would frequently say how important it was to be nice because it is very difficult for your enemy to take you on if you've been nice."

It produced results. Murphy helped to expand the regulation of large poultry operations and enact a law restricting the use of toxic chemicals in boat paints that had contaminated parts of the James River. His work is considered the foundation of the state's water and land protection efforts.

"Though the epitome of the Virginia gentleman, Tayloe was no pushover," said Roy Hoagland, former vice president of environmental protection and restoration

at the Chesapeake Bay Foundation. "A passionate advocate and a savvy negotiator, Tayloe could hold his own with the most vociferous of opponents. Humble, smart, gracious, gentle, kind ... he brought out the best in both friend and foe. There will never be another like him."

Murphy was known for both his passion and deep knowledge of the issues that he worked on and his lengthy descriptions of those issues to others. One newspaper article described him as "rarely good for a sound bite."

Joseph Maroon, who served as director of the state Department of Conservation and Recreation under Murphy

in the Warner administration, recalled that "working with Tayloe never ceased to be a learning experience. He often knew more about the subject than we did."

But he used that knowledge to his advantage. "Tayloe would come in and just barrage me with details that I was not

familiar with," Warner told biographer Will Payne, "and I'd say 'OK, just go ahead and do it.'"

While serving as natural resources secretary, Murphy was instrumental in persuading other states to collaborate with the U.S. Environmental Protection Agency in the development of the Chesapeake Bay total maximum daily load, which guides today's cleanup efforts, rather than leaving the task to the EPA alone as some anticipated. That state-federal collaboration was later cited in court rulings upholding the TMDL in the face of challenges that charged it represented EPA overreach.

"A lot of other state secretaries couldn't have done what he did," said Rich Batiuk, former associate director for science with the EPA's Bay Program Office. "The difference was Tayloe's personality. First and foremost he was a Southern gentleman, but he was a politician that worked the back rooms in terms of getting people together."

Not everything he championed led to success. With concerns rising in the 1990s about the toll that growth and development were taking on Bay water quality, he spent years developing an act that would increase the state's role in managing growth, only to see it quickly killed.

But his willingness to take on tough issues was driven by a guiding principle — the Public Trust Doctrine in common law, which holds that subaqueous lands, the water above them and the living resources in them are held by the state in trust for the benefit of all people.

"The state is the trustee of these resources and has a fiduciary responsibility to protect them from degradation," he once said. "To allow special interest groups to damage our water resources — whether it be land developers, a wastewater treatment plant or some other contributor to pollution — is to deny the right to a clean resource to others who should be protected. When elected officials and the states finally take their role as trustees seriously, the Bay will thrive again."

Murphy also served on numerous boards, including those of Preservation Virginia, the Chesapeake Bay Foundation and the Northern Neck Historical Society.

He is survived by a daughter, Anne Carter Braxton Murphy Brumley, and four grandchildren. Helen, his wife of 63 years, died in 2019. ■

"When elected officials and the states finally take their role as trustees seriously, the Bay will thrive again."

— William Tayloe Murphy, Jr.

Shenandoah River's algae woes worsened this summer

Pollution shut down recreation in the North Fork

By Whitney Pipkin

Carpets of grass-colored algae have long plagued the Shenandoah River in Virginia, making it unpleasant to be on the water during some of the hottest weeks of the year. And the problem is getting worse. This summer, the state declared that an expansive algal bloom impacting more than 52.5 miles of the river's North Fork was not only unsightly and foul-smelling but also toxic to humans, pets and wildlife. The public health advisory was lifted in mid-September.

For Shenandoah advocates, the blooms — both those that are a nuisance and those that could harm users of the river — are a glaring reminder that more work is needed to clean up agricultural pollution in the region.

Algal blooms occur in the Chesapeake Bay, as well as streams, rivers and lakes throughout the Bay region. They generally indicate an ecosystem out of balance. Various factors fuel them, particularly in slow-flowing or shallow waterways. Among the culprits: nutrient pollution from fertilizers and sewage, as well as increasing problems from climate change, such as extreme wet and dry spells and warmer water temperatures.

In the Shenandoah River basin, drought conditions set the stage for a bloom that began to grow in July. Since mid-June, the North Fork — already a shallow waterway compared with others of its size — was below its 96-year average depth, according to a river gauge at Strasburg.

Shenandoah Riverkeeper Mark Frondorf said this year's crop of algae was a particularly bad version of the ones he'd seen in previous years and reported to state authorities. Frondorf and the Potomac Riverkeeper Network have submitted dozens of complaints about algal blooms on the Shenandoah over the past decade.

"On the North Fork, you get these big thick algal blankets, and they smell," Frondorf said of this summer's bloom. "A lot of people think there's been a sewer pipe that's ruptured. It's such an awful, foul smell."

The Virginia Department of Health regularly tests along certain public saltwater beaches for the presence of harmful algae and bacteria that make swimming unsafe.



Cattle stand on the banks of the North Fork of the Shenandoah River in Rockingham County, VA, where a harmful algal bloom recently closed more than 52.5 miles of the waterway to recreational uses. (Alan Lehman/Shenandoah Riverkeeper)

But testing in freshwater rivers is inconsistent and typically in response to a complaint.

After finding cyanobacteria in the Shenandoah's algae in mid-July, the county and then state health authorities issued advisories warning people to avoid the river. This less common type of blue-green algae releases toxins that, when touched or ingested, can cause rashes and gastrointestinal illness, and it can be fatal to dogs and other animals.

Additional testing in early August caused the state Department of Health to expand its advisory to encompass a total of 52.5 miles of the North Fork, a winding but shallow section of the river that laces through Seven Bends State Park in Woodstock.

Harmful algal blooms are a problem in all 50 states. In the Bay region, a 2015 study found that the blooms were occurring more frequently than they had 20 years before. Blooms across the country have been the subject of nearly 400 news reports so far this year, according to the nonprofit Environmental Working Group.

In Maryland, for instance, the Frederick County Health Department told residents to stay out of the lake at Cunningham Falls State Park just before Labor Day weekend due to toxic algal blooms.

Though this summer was the first time a section of the Shenandoah River was under a recreation advisory for a bloom of cyanobacteria, the river has a long history of being burdened by other types of algae.

The Shenandoah Riverkeeper and Potomac Riverkeeper Network sued the U.S.

Environmental Protection Agency in 2017 over excessive algae, which had caused fish kills and was regularly rendering the river unusable. They asked the courts to compel Virginia and the EPA to declare the Shenandoah River impaired by nuisance filamentous algae.

Inclusion on the impaired waters list would allow the Virginia Department of Environmental Quality to develop specific plans to reduce pollution from the surrounding landscape. The courts, though, ruled that the DEQ left the river off the list for good reason, pointing out that Virginia did not have an algae-specific water quality standard that could trigger such a listing. The decision stood despite an appeal that wrapped up in 2020.

Since then, the DEQ has been working on the problem anyway. The agency determined that it could develop a standard for measuring algae that would, over the course of a few years, help to determine whether a waterway is impaired by algae. It would be similar to a chlorophyll *a* standard that was developed for the James River a few years ago.

Measuring chlorophyll is a surrogate for directly measuring algae biomass, which is far more expensive and time consuming. Chlorophyll is the pigment that allows plants to convert sunlight into compounds through photosynthesis. Chlorophyll *a* is the predominant type in algae.

DEQ spokeswoman Ann Regn said the criteria being considered would help protect

recreational users in portions of the Shenandoah River's North Fork, South Fork and mainstem from nuisance filamentous green algae.

The agency does not at this time plan to adopt criteria to address blooms caused by cyanobacteria, like the one that occurred this summer.

"Filamentous green algae have been the focus of concern in the Shenandoah in recent years because large occurrences of cyanobacteria [in] mats or in the water column have not previously been observed by DEQ," Regn wrote in an email.

Advocates have long pegged runoff from livestock and poultry operations as a major contributor to the overgrowth of algae in the Shenandoah River. Agricultural runoff often contains nitrogen and phosphorus — nutrients derived from manure and fertilizer — which are the primary cause of algal blooms and other water quality woes in the Bay and many of its rivers.

"We have huge inputs of nutrients into the [Shenandoah] river that fuel both types of algal blooms," said Phillip Musegaas, vice president of programs and litigation for the Potomac Riverkeeper Network.

A 2017 report from the Environmental Integrity Project found that fields in the counties around the Shenandoah River received at least one and a half times more phosphorous than the amount needed by the crops harvested in those counties, which allows excess nutrients to run off into local waters.

Frondorf, the Shenandoah Riverkeeper, said progress has been made on many of the farms that abut the river. The number of cattle herds with access to the river, where the animals can defecate directly into the water, has gone down from 75 to about 15 since 2015, he said.

In 2020, the Virginia General Assembly passed a bill that will require cattle operations with 20 or more bovines to use fencing to exclude the animals from streams starting in 2026. But the measure has several caveats related to whether the state meets its Bay pollution reduction goals in 2025 and if there is adequate funding to help farmers install the fences.

"Algal blooms are hard to predict, sort of like the weather, but we know that nutrients always exacerbate the issue," said Joe Wood, Virginia senior scientist for the Chesapeake Bay Foundation. "If we invest more in cleaning up nutrients to the Shenandoah River, the river will be better and so will the Bay." ■

Mussels, ripe for investment, could lead to cleaner rivers

Report makes case for more research, funding and restoration

By Whitney Pipkin

As the heat index crept toward 104 degrees on a mid-August afternoon, it was easy to feel what the freshwater mussels nestled into a nearby stream in Reston, VA, were up against.

“We know that mussels remove pollution, but will they live in this environment?” asked Mike Rolband, whose nonprofit Resource Protection Group is studying if mussels can improve — and survive in — restored urban streams. “If they do, this could be a really cool way to improve water quality more at the source.”

Rolband isn't the only one betting on freshwater mussels as wonder workers for water quality in the upper reaches of the Chesapeake Bay watershed.

After several years of workshops and research, the Chesapeake Bay Program's Scientific and Technical Advisory Committee has released a report concluding that mussel restoration is ripe for broader investment by those looking to clean up the Bay and its rivers.

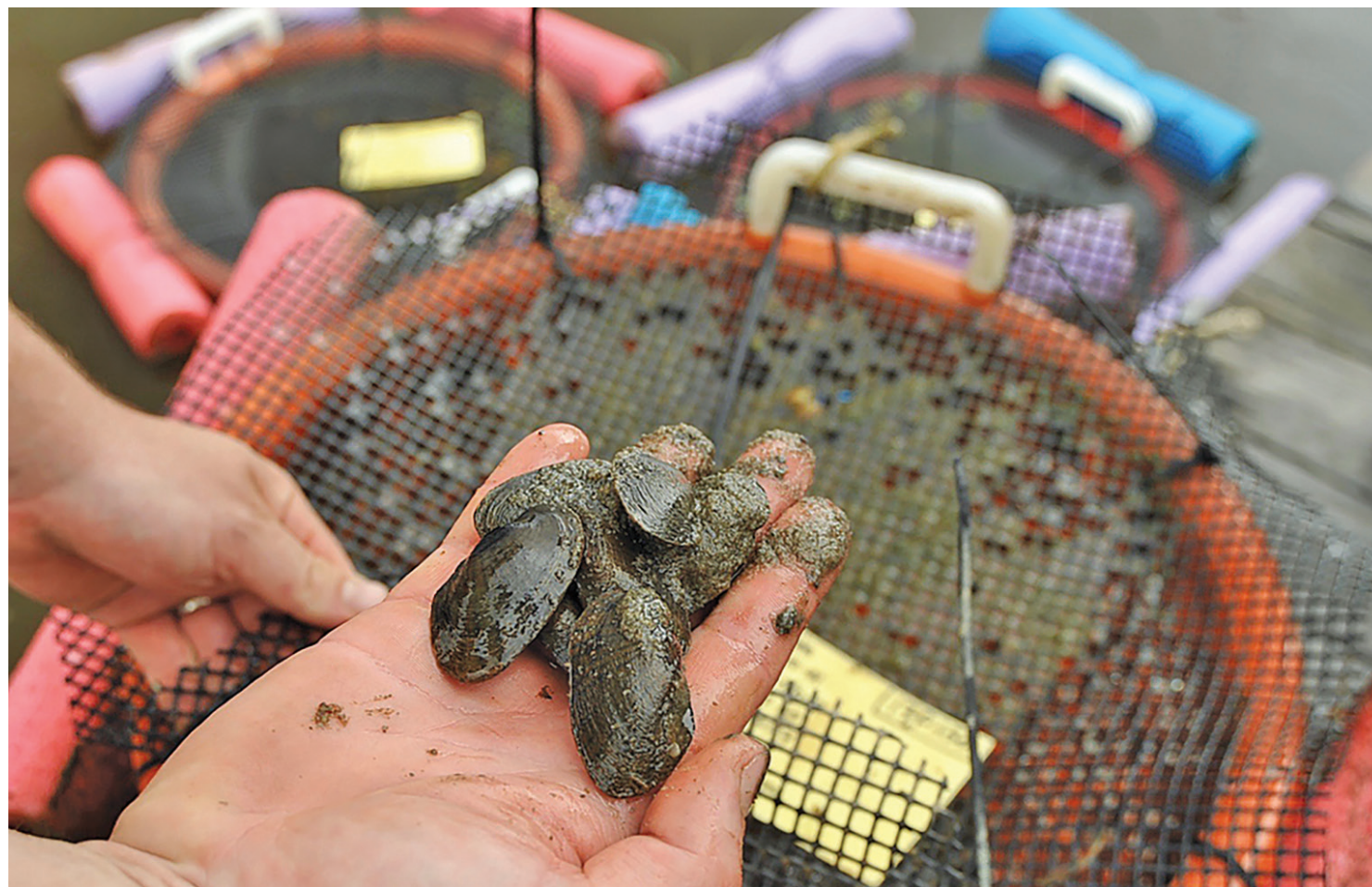
Oysters have long been lauded for their role as water-clearing filter feeders in brackish and saltwater portions of the Bay. Now, advocates argue that a new focus on mussels could help clean up freshwater systems as well.

These areas have no crabs, oysters or other iconic Bay species, but mussel advocates say the bivalves are a potential mascot for clean water in the rest of the watershed.

Many of the more than 25 mussel species known to live in the Bay watershed are the product of complex life cycles which, among other things, can involve tricking fish to help nurture and spread their larvae.

Mussels' unusual attributes — and the sheer diversity of species with names like heelsplitter, pocketbook and pigtoe — are among the reasons that “people just get jazzed about them,” said Joe Wood, Virginia senior scientist for the Chesapeake Bay Foundation.

The state-federal Bay Program report stemmed from a March 2020 workshop that brought dozens of researchers and mussel backers together to crunch numbers and prove the thesis they've been operating on for some time: Mussels deserve as much



The number of hatchery-grown mussels, like these grown at Harrison Lake National Fish Hatchery in Charles City, VA, is set to increase in the Chesapeake Bay region as enthusiasm and funding for freshwater mussel restoration continues to increase. (Whitney Pipkin)

play in clean-water conversations as oysters.

“The whole point of the workshop was really to raise freshwater mussels in the eyes of the Bay Program community and say, ‘Why are we not working on this?’” Wood said. “Because it sure fits with a lot of the things that we say we care about.”

The 53-page report details the ecological value of mussels and their potential to help reach Bay restoration goals. It also makes a case to establish funding streams for shellfish restoration that can be more specifically applied to mussels.

Show mussels the money

The *Chesapeake Bay Watershed Agreement*, signed by Bay states and the federal government in 2014, includes goals to improve the habitats and populations of shellfish. But the report found that, in practice, those efforts have largely left out mussels.

“Mussels aren't the solution to all of our problems by any means, but right now they're not even a part of the conversation,” Wood said.

Without dedicated funding, mussel restoration in the Bay watershed has largely

ridden the tides of intermittent income. Mitigation payments for environmental disasters or permit renewal programs have bankrolled the seeding of tens of thousands of mussels in places like the James River. But mussel researchers would like to see steady funding from Bay partners, such as the National Fish and Wildlife Foundation, opened up to mussel restoration as well.

NFWF, a congressionally chartered foundation that distributes much of the federal money for Bay restoration, is a key partner in restoring eastern oysters in the Chesapeake watershed. The foundation supports freshwater mussel programs in the Southeast as well. The report said a first step toward improving support for mussels in the watershed would be for NFWF to include them as a priority species.

Freshwater mussels could use the help. They represent the most endangered class of organisms in the country. More than a third of the species known to be in the Bay watershed are considered threatened or endangered, and scientists estimate that the region has lost about 90% of the mussels it once had.

Many endangered mussel species tend

to be geographically limited, making them more vulnerable to disturbance, while others are widespread. A 1998 tanker truck spill in Virginia's Clinch River severely impacted populations of three endangered species.

Mussel restoration up to this point in the Bay watershed has largely focused on bolstering populations of endangered or threatened species. But the region's hatcheries are increasingly capable of providing large numbers of more common species to boost water quality programs.

The Joseph Manning Hatchery in Brandywine, MD, will be expanding to include freshwater mussel propagation. Their output will provide baby mussels for restoration projects on the Susquehanna River. The work there is supported by the relicensing agreement for the Conowingo Dam, which will generate millions of dollars to create and sustain a large-scale mussel restoration effort for the river.

The Susquehanna, which is home to 18 mussel species, will also receive an infusion of mussels from a new hatchery program at Bartram's Garden, a park in Philadelphia

that will use the facility to educate visitors about bivalves while propagating them for restoration. The 8,500-square-foot freshwater mussel hatchery, supported by the Partnership for the Delaware Estuary and the Pennsylvania Infrastructure Investment Authority, will produce up to a half-a-million mussels a year for regional streams.

Restoring mussels, though, is not as easy as throwing them in the water. The new report points toward the need for research that would help ensure restoration efforts succeed.

Surveys of historical and existing mussel populations are limited, making it difficult to know where efforts should be focused. There is also a lack of data on what caused certain mussel populations to decline, though poor water quality, development and a loss of host species are among the likely factors. Though some mussel species are hardier than others, many of those conditions may need to be improved before adding mussels to the system.

Ecosystem benefits explored

Even with these challenges, the report argues that mussels are worthy of more exploration, especially for their potential to help reduce nutrient pollution.

Scientists understand, in general, the roles that mussels play in freshwater systems. They are cornerstones of their habitats, providing food for other animals and often improving water clarity. And they filter material from the water, enhancing the removal of nitrogen — the primary nutrient fouling the Bay — as well as potentially removing other pollutants.

What's less clear is how much nitrogen various mussel species pull from the water and how long those removals last. So far, the report said, there are hints that mussels might perform as well as or better than more traditional best management practices, such as forested buffers along streams.

Based on rough estimates, the report found that the Susquehanna River in its pristine past might have supported enough mussels to remove as much as 8% of its current nitrogen loads to the Bay. Today's depleted population would remove only a fraction of that amount, the report said.

But there are large uncertainties. While mussels, like oysters, remove nitrogen from the water, they are often spread across a stream bottom, rather than clustered in reefs like oysters. Different mussel species, and those in different habitats, may filter at significantly different rates. Those are among the issues that Mike Rolband wants to explore with his mussel project in the Reston stream.

The pilot project there will compare two similar stretches of streams that were restored more than a decade ago with funds from an expansion at Dulles International Airport. Mussels were placed in one of the streams in 2020 and, if they survive their first year, hundreds more will be added. Then, both will be closely monitored for two years to measure differences in nutrient concentrations and water clarity.

One of the major obstacles for mussels in urban streams is that they can be buried by sediment from erosion after heavy rain. But, in this part of Reston, where roughly 12 miles of streams have been re-engineered to handle stormwater from nearby neighborhoods, mussels could stand a chance.

"If you use mussels to clean water at these headwater streams, you're solving a local water quality issue and improving the Bay," Rolband said.

Spreading the love

Mussels are already beginning to play a role as mascots for clean water, according to the report. In local streams, these backyard bivalves are helping to engage the public in a way that faraway blue crabs can't.

Buoyed by a flurry of research and excitement around mussels, water quality groups have already started spreading bivalves in areas where they've had a historical presence.

The Anacostia Watershed Society started growing mussels in floating baskets in 2018 after surveys found evidence of eight native freshwater mussels in the Anacostia River. Jorge Bogantes Montero, a natural resource specialist with the society, said the alewife floaters, Eastern pondmussels and Eastern lampmussels have exceeded expectations with high survival and growth rates.

"We've been talking about wetlands for decades, and they're important and cool,"



Volunteer divers helped the Potomac Riverkeeper Network retrieve and inspect a cage of mussels that was lowered from the docks at National Harbor in 2020 as part of a "50 million mussels" restoration project. (Courtesy of the Potomac Riverkeeper Network)



A restored portion of Glade Stream in Reston, VA, features mussels growing in cages this summer. Researchers involved in the project want to see whether restored urban streams can support freshwater mussel restoration to benefit both local waters and the Bay. (Whitney Pipkin)

Montero said. "But they just don't catch the same attention as mussels. We get new members and donations just because of the mussel project."

With grants from the DC Department of Energy & Environment, NFWF and others, the nonprofit has since released about 19,000 mussels, mostly to the Anacostia's Kingman and Kenilworth lakes. The mainstem of the river is expected to be dredged in coming years to remove legacy toxics

from the sediment and could one day be a candidate for mussels, too.

Emily Franc, vice president of Development and Philanthropy at the Potomac Riverkeeper Network, watched the growth of mussels in the Anacostia while serving as its riverkeeper from 2015 to 2018. She's also seen the health of both rivers improve as sewage overflows have sharply declined in recent years.

"I thought, 'Wow, we're really at that tipping point now where we've managed our pollution issues enough that we should be able to help mussels recover,'" she said.

While researchers continue to chip away at the biology of mussels, Franc saw that groups like hers were starting to invest in restoration and wanted to serve as a catalyst. The network launched the "50 Million Mussel Project" in 2020 to elevate the work being done and inspire more in advance of the 50th anniversary of the Clean Water Act next year.

"If we can really explode this conversation, people will get excited," said Franc, whose mother offered to donate after learning about the mussel project. "People have been well-educated about oysters, so we think about them and fund them. We want to do the same with mussels." ■

Pollution violations found at Baltimore's sewage treatment plants

Questions raised about oversight after months of discharges into Baltimore rivers

By Timothy B. Wheeler

Baltimore has long been plagued by sewage leaks and overflows fouling its waters. Now, the city has a new pollution woe: poorly maintained municipal sewage treatment plants that for more than a year have been daily dumping millions of gallons of bacteria — and nutrient-laden wastewater into rivers that flow into the Chesapeake Bay.

After a watchdog group's discovery of high bacteria levels in wastewater coming from one of the city's two sewage treatment plants, an inspector for the Maryland Department of the Environment has found "numerous deficiencies and violations" at both facilities.

In visits to the city's Patapsco Wastewater Treatment Plant in May and to the Back River plant in June, the MDE inspector found operational and maintenance problems, with key treatment equipment malfunctioning or out of order, staffing shortages and botched sampling for toxic contaminants in the wastewater.

The laundry list of problems uncovered at Maryland's two largest wastewater plants threatens Bay restoration efforts, environmentalists warn. It also raises questions, they said, about the diligence of state regulators in ensuring compliance with pollution limits.

City public works officials were scheduled to meet Sept. 3 with state regulators after an Aug. 23 letter from the MDE demanded immediate corrective actions and warned the city that it faces fines of up to \$10,000 per day and possible legal action by the state attorney general.

"We're going to hold [the Department of Public Works] accountable," MDE Secretary Ben Grumbles said in an interview. "They have a lot of explaining to do."

In response to press queries, a spokesman released a short statement from Public Works Director Jason Mitchell. He said that his staff "has developed a strategy to get back into compliance and will be providing a timeline for compliance to MDE."

Alice Volpitta, the Harbor Waterkeeper, said she and her colleagues at the nonprofit



Baltimore's Patapsco Wastewater Treatment Plant, in left foreground, discharges about 55 million gallons of treated wastewater daily into the Patapsco River just upriver of the Key Bridge. (Jane Thomas/Integration and Application Network, UMCES)

watershed group Blue Water Baltimore were "pretty shocked" by the scope and severity of problems uncovered at the city's wastewater plants after the group reported detecting high fecal bacteria levels in the Patapsco plant's discharge in April and early May.

In prior years, Volpitta said, Blue Water Baltimore's monitoring program had picked up occasional bacteria spikes at the Patapsco plant, usually when it was overwhelmed by inflows from heavy rains. But this spring, she and her team detected "consistent ongoing high bacteria readings" unrelated to rainfall at the plant's outfall just upriver of the Key Bridge.

The city has spent \$1.6 billion since 2002 to comply with a state-federal consent decree requiring an overhaul of its sewer network to halt frequent overflows and leaks of untreated sewage. At the end of 2020, city officials announced the near completion of a \$430 million "headworks" project at the Back River plant, which officials predict will eliminate 83% of the overflows. The city is also spending millions annually to curb polluted stormwater runoff from streets, parking lots and buildings.

But because those two plants treat a high volume of wastewater, their discharges of inadequately treated sewage threaten to offset those efforts, environmentalists

contend. Back River discharges about 72 million gallons of wastewater daily, while Patapsco releases about 55 million gallons.

According to Blue Water Baltimore, the combined daily discharge of the two plants would fill a 2.5-foot-deep wading pool the size of the city's 155-acre Patterson Park. By sheer volume alone, though not necessarily the pollutants, the plants' daily combined discharge is on par with the cumulative amount of rain-diluted sewage that overflows each year across the city.

"If we can't trust our wastewater treatment plants to actually treat the sewage," Volpitta said, "it doesn't really matter much what other ... best practices we're putting on land."

Documented violations

The MDE inspection reports detail numerous violations at each plant, many of them similar.

At the Patapsco plant, the MDE inspector found that it had repeatedly violated limits since July 2020 on levels of harmful bacteria, phosphorus, nitrogen and total suspended solids. Overall, the plant exceeded its total authorized nitrogen discharge for 2020 by nearly 140,000 pounds and surpassed its total phosphorus load by 47,800 pounds. Fewer than half of the units used to screen incoming sewage were operational, and those were so clogged

with trash and debris they couldn't work properly, the inspector found.

Plant managers blamed the exceedances on equipment failures and on a worker shortage because of the coronavirus pandemic, the MDE report said.

But the MDE inspection found that the Patapsco plant also has failed to comply with a 2016 consent order requiring it to reduce discharges of fats, oils and grease into the river. The city had yet to upgrade or replace equipment needed to remove the pollutants despite a 2018 deadline, and only five of 18 settling tanks to be used for the removal were working at the time of the visit. Some were so full of scum the inspector warned they would also fail soon without prompt maintenance.

At the Back River plant, the MDE inspector said the discharge exceeded permit limits on pollution every month but one from August 2020 through May 2021, with excessive levels of nitrogen, phosphorus, total suspended solids and ammonia, and a couple of instances of elevated bacteria. Plant managers said there had been a malfunction of a key piece of equipment, a centrifuge used to separate solids from liquids. But the inspector noted that the exceedances began months before that breakdown and that managers had failed to report excessive discharges

promptly to the MDE, as required.

During his June walk-through, the MDE inspector also found “malfunctioning equipment because of maintenance problems” and that only two of 76 plant operators had permanent licenses, an indication of their level of training and expertise to run and maintain the facility properly. Plant managers told the inspector that some staff had failed to pass the licensing test and others had declined to take it because there was no incentive to do so.

The inspection further found defective sampling at Back River for toxic contaminants, particularly for polychlorinated biphenyls or PCBs, which rendered the results useless in gauging how much is being removed or discharged into the river. Fish consumption advisories throughout the Baltimore area advise recreational anglers to limit their meals of locally caught fish because of the buildup of PCBs in them.

Oversight questioned

MDE Secretary Grumbles said it is a “high priority” for state regulators to quickly rectify the situation.

“We know how important of a partner the city is in reducing pollution and helping the state meet its [Baywide nutrient reduction] requirements,” Grumbles said. “When there are problems at a treatment plant [involving] operation and management of the facility, that’s a heightened concern for us.”

Volpitta praised the MDE for taking action but said she was perturbed that the agency didn’t catch the problems sooner. She noted that in the year before Blue Water Baltimore’s sampling, the city had been filing required monthly discharge monitoring reports with the MDE and EPA, which made it clear that some pollutants were exceeding permitted levels.

“That’s the big question,” she said. “Why did it take so long for anything to come of that self-reporting?”

Grumbles said that MDE staff started looking at the plants’ monthly reports and getting information from the city in March. At that time, he said, they saw a “trend that was totally unacceptable” and began preparing for inspections.

The first inspection took place the day after Blue Water Baltimore gave the MDE its water quality findings. At the time, Volpitta said, MDE officials didn’t give any indication they were already aware of problems at the Patapsco plant.

“I think there’s a lot of questions to be answered here,” she said. “We’re very concerned about the lack of oversight that appears to have occurred.”

For the safety of its staff during the coronavirus pandemic in early 2020, the MDE cut back on physical inspections of facilities discharging into state waters. But even before that, it had begun conducting a growing number of compliance checkups without leaving the office by reviewing plants’ self-reported data.

Before this year, the MDE had physically inspected the Patapsco plant twice in 2016 and once each in 2017, 2018 and in June 2020, according to a spokeswoman. The Back River plant was inspected once in 2016, five times in 2017, twice in 2018 and once in 2019, she said. Three of the 2017 inspections were in response to complaints, the spokeswoman noted, without providing additional information.

Mitchell, the city’s public works director, said in his statement, without elaborating, that “the root causes for the violations have been identified by DPW and will be addressed systematically to ensure we achieve 100% compliance.”

Grumbles said, “it’s a priority for us to get this resolved as quickly as possible.”

But Volpitta said that, given the findings of the MDE inspections, she doubted that there’s a quick fix to all of the problems.

Josh Kurtz, Maryland director of the Chesapeake Bay Foundation, called for swift enforcement action against the city, but also questioned the state’s oversight of such facilities.



This photo from the state inspection report for the Patapsco Wastewater Treatment Plant in Baltimore shows settling tanks rendered inoperable by an accumulation of solids, fats, oils and grease. (Maryland Department of the Environment)

“Marylanders depend on government agencies to be transparent and accountable when problems arise,” Kurtz said in a statement. “In this case, it appears Baltimore’s Department of Public Works failed for years to address known problems at the city’s two wastewater plants, which led to months of partially treated wastewater flowing into the Baltimore Harbor and Chesapeake Bay during the previous year.”

And even if the MDE was investigating the plants before Blue Water Baltimore reported its findings, Kurtz found fault with the low-key way it was handled.

“Neither DPW nor Maryland Department of the Environment, the agency tasked with enforcing state pollution regulations, publicly addressed these ongoing issues at the plants until the nonprofit Blue Water Baltimore issued their findings in a news release,” he said.

The MDE has relied heavily on upgrading wastewater treatment plants to meet its nutrient reduction obligations under the Bay’s “pollution diet,” formally known as the total maximum daily load, which the EPA imposed in 2010.

“With such a heavy reliance on these upgrades,” Kurtz said, “the state must prioritize oversight of these facilities to ensure proper operation and impose penalties for violations.” Failures at large plants like Patapsco and Back River can undermine the overall Bay restoration effort, he added.

Kurtz also said the city and state owe more diligence to the health of Baltimore area residents. “Both plants serve and discharge into rivers and streams where underserved and frontline [citizens] live,” he said. “These communities have suffered from a legacy of disproportionate impacts of dangerously high levels of pollution, especially harmful bacteria.” ■



The Back River Wastewater Treatment Plant in Baltimore County, MD, features a distinctive gold-domed pair of anaerobic digesters used to process sewage sludge. (Kristian Bjornard/Wikimedia Commons)



An American eel, next to a crayfish companion, darts from a net during an eel population survey on the West Branch of the Susquehanna River. (Dave Harp)

Eels in the Susquehanna: A surprising success story

But the fish face ongoing migration challenges

By Karl Blankenship

A decade ago, Steve Minkinen and a team of biologists pulled into a boat ramp along a tributary to the West Branch of the Susquehanna River in Pennsylvania. Their pickup was hauling a blue tank filled with hundreds of squirming eels, ranging in size from large earthworms to small snakes.

To some, they had about as much appeal. One woman watched as the creatures poured from the tank into the creek. “Well,” she told Minkinen, who heads the Maryland fisheries office of the U.S. Fish and Wildlife Service, “I’m never swimming in this river again.”

She was only getting a glimpse of what was to come. Efforts to bring the slithery fish back to the East Coast’s largest river have accelerated. This year alone, more than 620,000 eels were returned to habitats they had dominated until the last century.

Although eels were once an abundant food for American Indians and early settlers, the river was devoid of them just two decades ago — the result of massive dams

built in the early 1900s, which blocked their migrations.

Eels fell off the radar of the public and resource managers alike. Restoration attention — and funding — turned to getting the higher profile American shad back upstream. Those efforts absorbed tens of millions of dollars but have largely failed to date: Since 2008, shad restoration efforts have succeeded in moving fewer than 2,400 fish beyond the four dams on the lower Susquehanna. During that same period, biologists trucked 800 times as many eels upstream — more than 2 million — at a fraction of the cost.

Started on a whim with a shoestring budget, the American eel restoration effort is transforming the ecology of the river. Surveys show they are not only surviving, but growing fast and spreading throughout the Susquehanna basin, where they once accounted for a quarter of all fish biomass.

Biologists hope the returning eels will prey on, and slow the spread of, rusty

crayfish, a troublesome nonnative invader. They also predict that the eels will boost populations of water-filtering mussels, which may eventually help improve water quality in the river.

That’s not all. Biologists now hope the surprising Susquehanna success will have consequences that reach far beyond the river or the Chesapeake Bay.

Eel populations have plummeted throughout their North American range in recent decades and are considered “depleted” today. But the Chesapeake region retains the greatest abundance of eels along the East Coast, and 40% of the habitat there is found in the Susquehanna basin. Biologists hope that returning that vast area to productive eel habitat could help bolster eel numbers from South America to the Arctic Circle.

A life full of mystery

Eels have been surprising people for nearly as long as humans have existed. They live in a greater variety of habitats than any other fish in North America, from deep ocean waters to tiny headwater streams. They even crawl into ponds with no connection to any creek.

Especially perplexing for centuries was the question of where eels come from, as most have no sex organs, and no one knew where they spawned. Aristotle thought they were spontaneously produced in mud.

Some thought they came from earthworms.

Scientists now know — at least they’re pretty confident — that American eels come from the Sargasso Sea, a large expanse of the Atlantic Ocean off Bermuda bordered by strong ocean currents that is known for massive beds of seagrass.

No one has actually seen a spawning eel, nor even a dead post-spawn eel. But plenty of eel larvae are found in that area.

The larvae float with ocean currents for about a year until transforming into small, transparent “glass” eels that are capable of swimming, allowing them to break free of currents and head toward the coast.

They gain green-brown pigmentation, becoming “elvers” as they move into brackish coastal habitats, like the Chesapeake Bay, and upstream into rivers. At around 4 inches, they transform into larger yellow eels, an appearance they will retain for years or decades — not that most people see them, as they also become nocturnal and live under rocks and roots or in the mud.

They remain sexless until they are nearly ready to transform into their final stage: the silver eels, which are 2– to 3-foot long. These mature eels then make an enormous migration back to the Sargasso Sea to spawn. They have thicker skins and larger eyes to help survive the journey.

This is the opposite of anadromous species, like shads, salmon, river herring, striped bass and sturgeon. Those fish briefly visit freshwater rivers to spawn but live most of their lives in the ocean.

“Eels do everything backward,” Minkinen said. Eels are the only “catadromous” fish in North America, breeding in the ocean but living most of its life in brackish or fresh water.

Eels face a dam problem

That unusual lifecycle may have contributed to the demise of eels — and is the reason the Susquehanna might be a key to their comeback.

An eel’s sex is not determined until later in life, and research suggests that those in dense populations tend to be mostly males. Those that reach sparsely populated headwaters are almost exclusively females.

By congregating eels downstream, dams may be restricting the production of females needed to help the coastwide stock reproduce. Some crawl over, or around, smaller structures, but each can reduce the number of eels that get by. Large dams — like the 94-foot-high Conowingo — can totally shut down their passage.

If the river were to be fully reopened, Minkinen estimates that the Susquehanna alone could eventually support 11

million mostly female eels. Some think that number is low.

That's important because, unlike anadromous fish that return to their native rivers to spawn, the entire eel population breeds as a group in the Sargasso Sea. Their offspring are flung across the coast by ocean currents, rather than returning to a specific river.

Therefore, a rejuvenated Susquehanna population, biologists hope, could help rebuild eel numbers all along the coast, which is near its all-time low. But it's hard to say for sure because of the eel's unique life cycle, and they are poorly studied compared with anadromous species.

It may be that eels from some places never get back to their spawning ground in the Sargasso Sea. In terms of reproduction, eels from some areas may be significantly more important than others. Are fewer big females with lots of eggs from one location more important than lots of smaller females with fewer eggs from someplace

else? No one knows.

"It's really hard to fit eels' life history into a quantitative model," said Kristen Anstead, a stock assessment scientist with the Atlantic States Marine Fisheries Commission. "Eels just become — highly scientific term — weird all the time."

If Susquehanna eels do boost spawning, measuring their impact could be difficult because an increase in small eels would be spread from South America almost to the Arctic Circle. But, "it is pretty standard to think that the habitat loss with dams is a really big issue with eels," Anstead said.

"Conowingo does seem to be a pretty big success story right now," she added. "I hope that does mean something for the population."

Once prized, then forgotten

The steady success on the Susquehanna is a surprise because it was so improbable.

Eels were once an important part of the river. They were a major food for American Indians because they packed far more calories than other fish. Early colonists reported Onondagas roasting eels along the Susquehanna's headwaters. The river is still filled with stone weirs constructed hundreds, if not thousands, of years ago, to capture eels.

European settlers developed a taste for them, too. A report from the Pennsylvania Department of Fisheries more than a century ago stated that the number of eels migrating up the state's rivers each spring was "simply enormous."

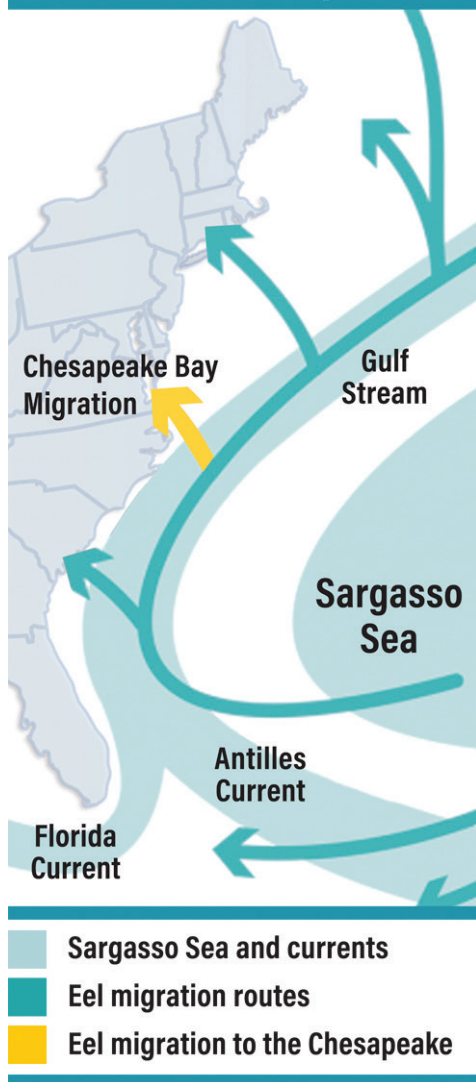
But their days on the Susquehanna ended in the early 1900s when a series of hydroelectric dams closed the river to migrating fish. The last straw was Conowingo Dam, completed in 1928, leaving just 10 of the river's 440 miles unblocked.

Pennsylvania periodically supported efforts to truck eels around the dams until around 1980, but the numbers found in the river declined, and fisheries vanished. In recent decades, they essentially stopped showing up.

Despite their historic significance, eels became a low restoration priority. When resource agencies and utilities that owned the hydroelectric dams negotiated operating licenses decades ago, they called for huge investments to get migrating shad upstream. Eels were ignored.

Tens of millions of dollars were spent building fish elevators to carry shad over dams. Those fish tend to migrate during the day and follow strong midriver flows. The elevators were never suited to move small, juvenile eels that migrate at night along slower currents at the rivers' edge.

American Eels: Path to the Chesapeake



Graphics by Design



Steve Minkkinen (foreground) of the U.S. Fish and Wildlife Service works with other biologists from the agency to insert transmitters into eels to track their travels in the Susquehanna River. (Dave Harp)

About two decades ago, Minkkinen became intrigued with eels after seeing efforts to improve eel passage on the Shenandoah River. If you could give eels a hand there, he wondered, what about the Susquehanna?

Minkkinen kept hearing stories from people working with shad near the Conowingo Dam. "There are eels crawling up the rocks," they told him.

"That," Minkkinen said, "is when I had the idea that it could be a really good place to catch eels."

He had no budget to work with, but he got permission from Exelon Corp, which owns the dam, to collect eels that pile up below the structure. Working with low-tech materials from hardware stores, Minkkinen's team constructed a small tray that angled down the steep rip-rap lining the river's edge. They ran a small trickle of water down the tray hoping it would attract migrating eels.

The first year, 2005, they caught 42. The next had 19. They tinkered with equipment and location, and in 2008 collected more than 42,000 eels and began trucking them upstream. Their best year — shortly before Exelon took over the task and upgraded the eel-catching devices — was in 2013, when they collected 293,141.

"For a device that we probably spent less than \$2,000 on, we had something that worked," Minkkinen said.

A surprising link to mussels

Around the time Minkkinen and his team were tinkering with eel collection

below the dam, biologists at the U.S. Geological Survey's Northern Appalachian Research Laboratory, located hundreds of miles upstream near Wellsboro, PA, were focused on seemingly unrelated work with freshwater mussels.

Mussels also have a complex life cycle: Successful reproduction requires that larvae attach to a fish, where they live as a parasite for a time before dropping off and growing on their own. While some mussels use many fish species, others are picky about which serve as hosts.

The USGS biologists wanted to understand the decline of rare mussels. They wondered whether too few fish hosts might be contributing to the problem. Their big surprise, though, came when they looked at the river's most common mussel, the eastern elliptio.

"They're so common you would think they use everything," said Bill Lellis, the biologist who led the work. Instead, he found that the eastern elliptios relied almost exclusively on eels.

Follow-up surveys showed that the Susquehanna had fewer elliptios than the neighboring Delaware River. Further, the Susquehanna mussels were old. It appeared that the eel-less river was not producing young mussels, unlike the Delaware.

Like oysters, mussels filter the water. In the Delaware, Lellis estimated that approximately 280 million elliptio mussels had the potential to filter 2 billion to 6 billion

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gallons of water and remove 78 tons of sediment from the water each day. With far fewer mussels in the Susquehanna, their filtering capability was dramatically lower.

A recent report from the Bay Program's Scientific and Technical Advisory Committee reached a similar conclusion, estimating that a robust mussel population in the Susquehanna might be able to remove 8% of the annual nitrogen load — a key Chesapeake Bay pollutant. Today's depleted mussel population eliminates only a fraction of that.

That's spurred more interest in hatchery-raised mussels that could boost the population. But mussel abundance could still be limited if they lack the right host fish to help them reproduce.

Minkkinen's fledgling effort to get eels upriver quickly adjusted to test the notion that more eels could help produce more eastern elliptio mussels.

From 2010 to 2013, his team stocked 118,742 eels in Buffalo Creek and another 122,049 in Pine Creek, both on the river's West Branch. The reintroduced eels thrived and produced an uptick in young mussels. In Pine Creek, juvenile mussels increased from zero to 21%. The increase in Buffalo creek was smaller, only a couple of percent.

The watersheds are greatly different, which suggests other issues may be at play. "I think that's due to water quality issues," Minkkinen said. Pine Creek is less developed and overwhelmingly forested. Buffalo Creek has



Young eels often collect at the base of Conowingo Dam, trying to swim upstream. (Dave Harp)



A mature eel swims along the rocky bottom of the West Branch of the Susquehanna River in Pennsylvania. (Dave Harp)

large amounts of agriculture — in places where the biologists did their surveys, the dominant "aquatic" animal seemed to be cows, rather than eels.

A gauntlet of dams

The effort to return eels to the Susquehanna still has something to prove. It has to show they can *leave* the river. While trucking small elvers upstream has been relatively easy, it's another matter for mature eels, now several years old and several feet long, to migrate on their own downstream, past the dams.

"Everything isn't a success yet," Minkkinen said. "Not until you show that they actually are going to get out [of the river] and contribute to the population."

To help understand whether that happens, Minkkinen and three other biologists were wading through Buffalo Creek one day in late August, carrying battery-powered electroshocking equipment and nets. They were sending streams of electricity into the water, stunning fish just enough so that they could rise to the surface and be counted before swimming away again.

"There's a big one in there," Minkkinen said, pointing to a river bank with branches covering the water.

It took several minutes of work, shocking and reshocking the water, pressing a long-handled net into the vegetation and muck until, at last, Sheila Eyler of the Fish and Wildlife Service pulled out their target.

It was an eel — a female — more than two feet long. Though still predominantly yellow and green, it was starting to darken, beginning the process of "silvering."

Having endured a remarkable life that

started in the Sargasso Sea, a year or more in the ocean, a migration up the Bay and then a truck ride to Buffalo Creek, the eel was now sedated and given a small incision so biologists could insert a 1.5-inch transmitter.

The eel, designated number 60053, can now be tracked as she begins migrating out of the river in the next year or so. During that trip, she will further transform, absorbing her digestive track to provide added fuel for the 1,500 mile swim ahead. It will be a one-way journey.

Biologists want to learn if her trip is cut short. At the dams, eels can spill over the top, where they may smash on rocks below, or — more commonly — go through turbines, which can cut them to pieces.

Receivers have been established along the river in Harrisburg, above the dams, and in Havre de Grace at its mouth. They will pick up signals from the transmitters and allow biologists to determine the fate of 60053 and hundreds of other eels tagged in years ahead.

Right now, Eyler said, the goal is to have an 85% survival rate at each dam. Ultimately, that means that only about half of the eels that migrate past Harrisburg would make it to the Bay.

The good news, she said, is that most of the dams are big, with larger, slower turbines. A small test at Conowingo a few years ago produced a survival rate of 90% for eels passing through turbines.

But York Haven Dam, the first dam they encounter when moving downstream, has small, fast turbines. "We've had reports of several hundred dead eels downstream of that project in both 2019 and 2020," Eyler said.

Gaining respect

The fact that anyone cares about getting eels upstream or downstream is a remarkable reversal from 2005, when Minkkinen's team made their first attempt to catch eels at the base of Conowingo.

Now, a new operating agreement for Exelon Corp., which took over the eel trucking at Conowingo in 2016, ensures that efforts to move eels upstream will continue for decades to come. Most upstream dam operators also have eel-related obligations.

"They're on the radar now, and before they weren't," Minkkinen said. "That's a big change right there. So I'm really happy about that."

He and others are hoping that people will come to embrace rather than fear the remarkable and still mysterious creatures as they return.

Tracking by the Susquehanna River Basin Commission shows that eels are now turning up in most of the river's drainage. They have appeared near Clearfield on its western border and near Cooperstown, NY, near its northern edge. Both are far upstream from stocking locations.

Aaron Henning, a commission biologist, said that eels account for 40% of the fish biomass in one creek he's monitoring.

"They look weird and may be a nuisance when you catch them, but I think everyone is starting to understand their ecological value," he said. "There's not a person living in the basin who would disagree with the statement, 'we need more mussels.' People are ready for a feel good story like that." ■

PA launches renewed attack on invasive species

Seven agencies will coordinate actions to target problem species

By Ad Crable

Reeling from invasive species on land, water and air, Pennsylvania is accelerating its efforts to combat hundreds of nonnative plants, insects and fish.

“These species threaten the economy, environment and diversity of species [of Pennsylvania],” said the state’s Department of Agriculture Secretary Russell Redding at a recent legislative public hearing explaining an unprecedented effort to control invasives.

The new moves include bringing seven state agencies together for quick and coordinated attacks on new threats, revamping the governor’s Invasive Species Council and the hiring of a fulltime invasive species coordinator — Kristopher Abell, an entomologist and postdoctoral researcher from the University of Maryland.

The state is adopting a successful model used in New York that prioritizes early detection of invasive species, maintains a database of culprits and sets up regional public-private partnerships to try to stop newly discovered problems in their tracks.

The state will step up public education about the damage that results from spreading invasive species, and the state legislature may be asked to set fines for citizens and businesses that violate anti-spreading rules. And for good reason: Nonnative rusty crayfish got established in Pennsylvania when anglers bought them as bait and released them in the water at the end of their fishing trips. The red-eared slider, an enormously popular aquarium turtle, native to more southerly states, is often released into lakes and ponds when they grow too big. There, they eventually crowd out native species and impact local ecosystems.

To identify priority targets, the state is ranking invasives based on their potential impacts to the economy, agriculture, forestry, environment and human health — as well as public recreation, including hunting, fishing and tourism.

Invasive species are the leading threat to biodiversity in Pennsylvania, second to habitat loss. For example, invasive plants can undermine newly established streamside buffers that have been planted to reduce agricultural runoff, and they can break up dirt and gravel roads.



Red-eared sliders, not native to Pennsylvania, are popular with aquarium hobbyists but are released in lakes and ponds when they get too large, disrupting native species and the local ecosystems. (Pixabay)

Invasives were first established in the United States in the 1700s and 1800s when pioneers and immigrants relocated plants to remind them of home. Over time, some have been deliberately spread with hopes of solving problems.

Some introductions have been colossal mistakes. House sparrows were brought from Great Britain to Brooklyn in 1851 to feed on tree-damaging caterpillars. The sparrows are now despised because they are aggressive, taking over nests and even killing some birds, such as bluebirds.

Goat’s-rue, a plant from the Middle East, was introduced in Utah in 1891 as a forage plant for livestock. It turned out to be poisonous to sheep and cattle, but that didn’t stop it from establishing itself there and in other states, including Pennsylvania.

New nonnatives continue to find their way to Pennsylvania, thanks to a global economy in which they can be inadvertent stowaways in cargo on ships, trucks and airplanes. After the plants or creatures arrive, people unknowingly spread the hitchhikers when they travel.

Among the disruptive nonnatives that have arrived in the state in the last 14 years are the northern snakehead and round goby (fish); emerald ash borer and spotted lanternfly (insects); water chestnut, goat’s-rue, Palmer amaranth and water hemp (plants); and New Zealand mud snail.

They join such pests as gypsy moths, hemlock woolly adelgids, Asian ladybugs, marmorated stink bugs, tree of heaven and feral swine that arrived a decade or two

earlier and are still bedeviling crops and trees, and even invading people’s homes.

Invasives often multiply rapidly and wreak havoc because natural enemies are not present in their adopted ecosystem.

For example, the emerald ash borer, an insect that showed up in Pennsylvania in 2007, will likely kill all of the estimated 318 million ash trees in the state, except the precious few that can be treated chemically.

The spotted lanternfly, a colorful leaf-hopping insect from Asia, showed up in Pennsylvania in 2014, likely in shipments of stone from China. Now, 34 counties are under quarantine. “The economic impact could total in the hundreds of millions of dollars and the loss of hundreds of thousands of jobs for those in the grapes, apples, hops and hardwood industries,” warns the state Department of Agriculture.

One of the chief weapons against the insect to date has been to encourage the public to squish them and their egg masses on sight. Among the latest tools in the fight: dogs that can smell lanternfly egg masses.

Invasives sometimes create secondary nuisances and dangers.

Ash trees killed by the emerald ash borer are falling across streams, creating hazards and barriers for paddlers. Runaway Japanese barberry is creating ideal habitat for black-legged ticks and white-footed mice — bringing together the two ingredients necessary for the transmission of Lyme disease to humans.

The woolly adelgid, a tiny insect from Asia, has killed countless eastern hemlocks,

the state tree. The loss of hemlocks, which provide shade to cool water along many streams, is threatening brook trout habitat.

As an example of how hard it is to eliminate invasive species, consider the boll weevil. The insect became the scourge of the cotton industry in southern states beginning in the early 1800s and was not declared defeated until 2009, despite the largest federal extermination effort in history.

On the other hand, Pennsylvania officials point to the plum pox virus as a modern-day success story. After the virus was found on some 1,500 peach trees in 1999, fruit trees were cut down and destroyed in all infected orchards. Other orchards in the region were placed in quarantine, and new plantings of susceptible fruit trees were forbidden. The virus has not been found since 2006.

Pennsylvania, so far, has not adopted one important aspect of the New York model: dedicated funding. While New York legislators fund their invasive program with a \$13 million annual budget, Pennsylvania has no dedicated funding source.

State Sen. Gene Yaw, who held the legislative public hearing hosted by the Center for Rural Pennsylvania, said obtaining dedicated funding for the program was “paramount.”

Ag Secretary Redding said that despite the lack of funding, “we’ve got the right plan, the right people and a vision.” ■

To read about more than two dozen projects and learn about Pennsylvania’s effort to fight invasive species, visit agriculture.pa.gov and enter “Governor’s Invasive Species Council” in the search field.

MD moves to curb pollution from chicken-rendering plant

Regulators seek tighter discharge limits, vow to crack down on violations

By Timothy B. Wheeler

After years of complaints from its neighbors, state regulators have ordered a poultry-rendering plant on Maryland's Eastern Shore to curtail its pollution of a Chesapeake Bay tributary and say they will crack down on environmental violations there.

The Maryland Department of the Environment released in September a new draft wastewater permit for the Valley Proteins Inc. facility in Linkwood that would tighten limits on the amount of treated wastewater it releases into the Transquaking River.

"Our proposed actions mean cleaner water and a healthier watershed, with greater accountability for environmental violations," MDE Secretary Ben Grumbles said in a Sept. 15 press release. The release said the agency would seek a "significant financial penalty" as well as corrective actions for a series of alleged water and air pollution violations at the plant.

Environmental activists welcomed the announcement, but said it was long overdue.

"It's good to see some movement to protect water quality," said Matt Pluta, head of Riverkeeper programs for the nonprofit group ShoreRivers. "This is what we expected from them all along."

Local residents and environmental activists have complained for years that the state hasn't taken steps needed to improve water quality in the Transquaking, which flows through Blackwater National Wildlife Refuge before emptying into Fishing Bay and then the Chesapeake Bay.

The river has been classified for more than 20 years as impaired by nutrient pollution. The rendering plant is the river's largest single source of such pollution, which fuels harmful algae blooms and reduces oxygen levels in the water.

The state has allowed the facility to operate under a discharge permit that expired in 2006, despite a federal law requiring the permits be renewed every five years. "MDE has let it continue operating without updated [pollution] controls for 15 years," Pluta said.

In April, the Chesapeake Bay Foundation, ShoreRivers and Dorchester Citizens for Planned Growth jointly notified Valley Proteins that they intended to sue it for



Valley Proteins is a chicken-rendering plant located east of Cambridge, MD. (Dave Harp)

violating the federal Clean Water Act by repeatedly exceeding permit limits on its discharge of pollutants such as fecal coliform, nitrogen, phosphorus and ammonia.

The plant takes up to 4 million pounds of chicken entrails and feathers daily from poultry processing plants, according to MDE documents, and renders them into pet food. It's currently permitted to discharge up to 150,000 gallons of treated wastewater daily, and it uses an air scrubber to control odors.

In the draft permit, the MDE has set caps on how much nutrients — nitrogen and phosphorus — the plant can discharge, regardless of volume. Those caps represent a 43% and 79% reduction, respectively, from what is permitted now. To stay within those limits, the plant will have to upgrade its treatment, even at the current maximum discharge volume of 150,000 gallons per day.

But in 2014, the company sought state approval to increase its allowable daily discharge to 575,000 gallons daily to expand production. Local residents and environmental groups objected, arguing that the facility was already polluting the water, and the issue has been unresolved until now.

Earlier this year, the state was poised to give Valley Proteins a \$7.6 million grant

to help upgrade its treatment facility for expansion. It would have been the first such grant to a private company from the state's Bay Restoration Fund.

Now, though, amid allegations of pollution violations at the plant, the MDE has decided not to provide the grant to Valley Proteins.

"The company has a lot of explaining to do, and the competition for [Bay Restoration Fund] dollars among other applicants is continuing to grow," Grumbles said in a written statement.

The draft permit would give the company

the option to boost its wastewater output, but it would still have to adhere to the proposed nutrient caps. That would necessitate upgrades completely at the company's own expense.

With the state grant off the table, Michael A. Smith, Valley Proteins vice chairman, indicated that the company would forgo the overhaul.

Instead, Smith said, the company plans to make less costly upgrades, which should be enough to meet the new nutrient limits with its current volume discharge. "So there will be capital improvements but not to the magnitude it could have been had the funding come through," he said.

Activists said they are guardedly

optimistic but intend to keep pressing the MDE on tightening the permit.

Fred Pomeroy, president of Dorchester Citizens for Planned Growth, said he was pleased to "finally get affirmation from MDE that the longstanding pollution issues will be addressed in the Transquaking River."

And Alan Girard, Eastern Shore director for the Chesapeake Bay Foundation, said activists were encouraged by the MDE's announcement "after more than a decade of inaction. However, appropriate actions must be taken in response to the company's repeated violations of the current permit and to ensure there is a commitment from Valley Proteins to comply with new pollution limits."

The company has been fined a total of \$5,000 over the last five years, according to a U.S. Environmental Protection Agency database. In the April notice of their intent to sue, the environmental groups said that public reports the company submits to state and federal regulators show the plant has repeatedly exceeded its discharge limits in recent years.

In its press release, the MDE said its investigators have found multiple infractions from July 2018 to the present. MDE spokesman Jay Apperson said those include exceeding currently permitted limits on several pollutants, plus an unauthorized discharge of only partially treated waste.

Also, in response to odor complaints, an MDE inspector visited the plant in August and cited it for an air pollution violation after finding fault with the operations and the monitoring of its emission scrubber.

The draft permit includes updated groundwater monitoring requirements that the MDE said could provide more information about potential sources of pollution. It also contains more requirements for proper sludge management and reporting on its disposal.

"We are working with the facility, citizens and advocacy groups to ensure environmental progress using our regulatory enforcement tools," the MDE's Grumbles said. ■

The MDE has scheduled a virtual public hearing for 5 p.m. Oct. 20, with an in-person hearing at a date and place to be determined. The department will accept written comments on the draft permit if submitted by Dec. 15. For information, visit mde.md.gov.

Bay Journal staff writer Jeremy Cox contributed to this story.

"It's good to see some movement to protect water quality."

— Matt Pluta
Choptank Riverkeeper

VA offers incentives to poultry farmers to switch aquifers

Change could stabilize drinking water supply

By Jeremy Cox

To save the Eastern Shore of Virginia's limited drinking water, it's time for chicken farms to tap into an alternative supply, officials say.

The state Department of Environmental Quality has proposed incentives to prod new poultry farms into drilling their wells into the aquifer lying just yards below the ground's surface.

That "surficial" aquifer, dubbed the Columbia, refills with rainwater at an exponentially faster rate than its deeper counterpart, the Yorktown-Eastover aquifer, officials say. As a result, it represents a more sustainable option for agricultural and industrial users, they contend.

Environmentalists say the move would be a good first step toward easing the strain that factory-scale chicken houses put on the Yorktown-Eastover aquifer, the sole drinking water source for the region's 45,000 residents. The threat to that aquifer is considered so critical that the Eastern Shore is one of only two areas in the state where large groundwater withdrawals must receive DEQ approval.

But getting farmers to switch to the Columbia aquifer may not be an easy sell. Chicken operations historically have bored into the Yorktown-Eastover because of a perception that it yields stronger flows with fewer impurities, such as iron and nitrates.

Chicken houses use water to hydrate their birds and keep them cool, especially during hot summer months.

Danny Bundick, who oversees one of the Shore's top well-drilling companies, chuckled when he recalled the sight from years ago of chickens that had been misted regularly with water drawn from the Columbia aquifer. Its high iron content had turned their feathers from white to brown.

But an even bigger concern is what that "very hard" water can do to a farmer's equipment, said Bundick of the Painter-based Bundick Well & Pump Co. Many would need to perform regular maintenance or install expensive water softeners to keep their pipes from getting clogged.

"It's not going to save them in the long run," he said. "It's going to be a headache and cost them a fortune."

The Yorktown-Eastover aquifer doesn't have those issues for the most part because



Danny Bundick of the Bundick Well & Pump Company looks on as driller Jerry Fisher, center, and assistant Ben Privegen drill a well into the Yorktown-Eastover aquifer near Chincoteague, VA. (Dave Harp)

it lies beneath a dense subterranean layer of clay that acts like a giant filter, straining out pollutants from fertilizers, chemical spills and other hazards at the surface. The surficial aquifer has no such protection.

Scott Kudlas, head of the DEQ water supply office, pushed back at the notion that the Columbia aquifer typically produces poorer water quality and supply. "Certainly, there are instances where that's the case," he said. "But our view is that those situations are limited enough that it's inappropriate to generalize that that's the case across the entire Eastern Shore. You need to test and see what it is at any one site."

The region's water woes are exacerbated by geography.

Virginia's Eastern Shore occupies the southernmost 70 miles of the Delmarva Peninsula. The land surface is narrow, measuring between 5 and 15 miles in

width. With saltwater all but surrounding the peninsula, the region has little area on which rain can land and seep into the groundwater below.

The problem is most acute in Accomack County, which covers the northern half of Virginia's portion of the Shore. Since July 2014, the number of permitted chicken houses has nearly doubled in the county, officials estimate. They attribute the spike to chicken farmers who, in an effort to reduce transportation costs, have positioned their operations closer to the region's two chicken slaughterhouses: a Perdue plant in Accomack and a Tyson plant in Temperanceville.

In 2019, state Sen. Lynwood Lewis, whose district includes the Shore, got a bill passed ordering the DEQ to encourage farmers to dip into the Columbia instead of the Yorktown-Eastover aquifer. Two years later, the agency has emerged with a

package of inducements, including a lower application fee, a waiver on geotechnical studies, a faster paperwork-processing schedule and an easing of reporting requirements.

The DEQ is accepting public comment on the proposal until Oct. 29. It could go before the State Water Control Board as early as December for the final go-ahead.

Jay Ford, the Chesapeake Bay Foundation's Virginia Policy and Grassroots Advisor, characterized the new permit as another sign of modernization in the state's water program. As recently as 2018, the DEQ and farmers ignored the longstanding law requiring large water users on the Shore to obtain permits.

"We didn't even know what was being used. We've really climbed out into the 21st century over the last couple of years here," Ford said. As for the state's approach in this case, he added: "We love when there's a carrot for doing things that are more sustainable."

Chicken house construction has slowed to a trickle over the past year or so on the Shore. Some environmentalists are wondering whether there will be enough new construction in the future for the new incentives to get much use.

"Unfortunately, the horse has probably left the barn," said Susan Mastyl, president of the Clean Water Council, a local conservation group formerly known as the Virginia Eastern Shorekeeper.

By only encouraging farms and industrial plants to sink their wells into the Columbia aquifer instead of mandating the action, the permit sidesteps politically thorny territory on the traditionally conservative Eastern Shore.

But some critics worry that it could turn away new businesses just the same.

In June, a proposal to add language supportive of the state permit to Northampton County's comprehensive plan overcame a late push by one elected official to delete it. Supervisor Betsy Mapp said that if new commercial users were restricted to the Columbia, its low flow rates would cause the local economy to dry up. Only after receiving assurances that the policy would be voluntary did she give her cautious assent.

"As long as it only says 'encouraging the use,' I can bear with it," Mapp said. "But to stipulate that a business or company must use the Columbia would be the kiss of death for any new business to locate here." ■



Scouting the marsh for a vanishing bird

Gravely imperiled saltmarsh sparrow an early victim of rising sea level

By Timothy B. Wheeler

Top photo: Kevin Reifenberg and Olivia Tran, "on-call" biologists for the U.S. Fish and Wildlife Service, scout a marsh in Fishing Bay on Maryland's Eastern Shore for saltmarsh sparrows and other marsh birds. (Timothy B. Wheeler)

Right photo: Saltmarsh sparrows breed only in tidal high marsh along the coast from Maine to Virginia. Their population has plummeted as their nesting habitat has been degraded and inundated by rising sea level. (U.S. Fish and Wildlife Service)

It seemed like an inauspicious start to a morning of birding. Ever so slowly, Pete McGowan guided a small powerboat into the marsh at the mouth of the Transquaking River on Maryland's Eastern Shore. McGowan, a biologist with the U.S. Fish and Wildlife Service, threaded the vessel through a grassy maze of increasingly narrow channels. Finally, he ran out of water, blocked by a towering green wall of phragmites.

With that, Kevin Reifenberg and Olivia Tran — a pair of "on-call biologists," as they described themselves — slipped over the side and plunged into the thicket of 7-foot high reeds. They quickly vanished from sight, their slog through the morass evident only from the sound of thrashing, splashing and their increasingly faint voices.

The trio was one of 15 crews searching in marshes from Virginia to Maine this summer for the rare, vanishing saltmarsh sparrow, a secretive little brown and gray bird with orange around its cheeks and a whitish belly. They nest only in grassy tidal marshes along the northeastern Atlantic Coast. And they're in big trouble. Rising sea



level is inexorably drowning their nests and nestlings.

"It's in pretty dire straits, to be honest," said Rebecca Longenecker, another USFWS biologist working on the survey. "We know that over 80% of the population has disappeared since 1998. Four of every five saltmarsh sparrows are gone. So it's pretty striking, pretty alarming stuff."

The birds were living dangerously even before climate change began to hit them. Saltmarsh sparrows build their nests beneath the grass in "high marsh," the most elevated parts of the squishy interface between land and water. High marsh typically floods only once or twice a month — on spring tides, when the sun, Earth and moon align to pull the water higher — or during coastal storms.

By nesting in such a precarious setting, the birds have evolved a

reproductive cycle that just fits into the lunar timetable. They can lay eggs, hatch them and nurture the chicks within about 28 days, between the extra-high tides.

Rising water, sinking land

But high marsh is increasingly turning into waterlogged low marsh. Sea level is rising faster than marshland can build itself up with accumulating sediment and decomposing plants. Along the Delmarva Peninsula, the water is rising even faster because the land itself is ever so slowly sinking — a geologic aftereffect of the end of the ice age 10,000 years ago.

Those rising waters, coupled with historic human alteration of marsh and nest predation by other animals, have put saltmarsh sparrows in a tailspin, biologists say. A survey conducted a decade ago found that the birds' population had plummeted 87% since 1998.

So, this year, federal and state wildlife agencies, in partnership with universities and nonprofit conservation groups, launched a survey to check up on the saltmarsh sparrow population. They also checked for some other marsh-dwelling birds, such as the black rail and seaside sparrow — which are also at risk from the loss and degradation of salt marsh habitat.

As best they could, survey crews revisited 1,700 locations from Maine to Virginia that had been surveyed a decade ago, so they could track any differences in habitat and bird abundance over that time. One spot that was checked along Maryland's coastal bays in the 2011–12 survey proved impossible to reach, Longenecker recalled, because it is now about 70 yards out in the water.

Hitting each assigned spot twice for consistency, Reifenberg and Tran helped to canvass an important portion of the sparrow's range. Delaware, Maryland and Virginia accounted for more than a third of the bird's population in the last survey.

McGowan, the boat's skipper, is a longtime staffer in the USFWS Chesapeake Bay field office. Reifenberg and Tran are members of the service's "rapid response team," recruited from elsewhere to help with the survey. Reifenberg is almost local, from Spotsylvania County, VA. But Tran hails from South Florida. She said she enjoyed spending time in the "Everglades of the North" — the Chesapeake Bay, with its "cute" birds like the saltmarsh sparrow.

On the Transquaking, Reifenberg used a handheld GPS to find the right spot in the phragmites jungle. The reeds were so tall and thick that he and Tran could only see a patch of sky overhead. Instead of pulling out binoculars, they unpacked a waterproof portable speaker. After listening intently for



Biologist Olivia Tran listens for a Virginia rail. Fellow biologist Kevin Reifenberg explained, "You rarely see them, but you do hear them. They're super-boisterous." (Timothy B. Wheeler)

five minutes, they began to play a series of pre-recorded bird calls, with short gaps in between. Clipboards in hand, they cocked heads to listen for any calls back from the wild.

In that 12-minute span, they heard the grunting call of a Virginia rail, a chicken-like bird that's not in the same trouble because of its much broader range.

Virginia rails are "pretty cryptic," Reifenberg explained. "They're really small and just run around in the marsh. You rarely see them, but you do hear them. They're super-boisterous."

But at that first stop, Reifenberg and Tran didn't hear any soft chips or high-pitched notes of saltmarsh sparrows. That was almost to be expected: Saltmarsh sparrows prefer to nest in shorter, wispiest grasses. Phragmites, an invasive non-native wetland plant, grows too densely and tall.

The next sites on their day's survey sheet took them into Fishing Bay, where they found better habitat — vast marshy meadows of light, wavy cordgrass and saltgrass. Reifenberg kept an eye and ear out for birds while Tran took inventory of the marsh vegetation before joining in the search. They scanned the marsh with binoculars and strained to hear the calls of their target species amid a cacophony of tweets, chirps, trills and twitters carried on a breeze from the orchestra of the more common birds flitting about the marsh.

Finally, the payoff. "All right, got one," Reifenberg whispered, pointing to where he saw a saltmarsh sparrow poke up from some distant grass before disappearing a moment

later. Spotting one is like playing the arcade game whack-a-mole, he said. They're tough to identify on sight with confidence because they appear so fleetingly.

When the survey is completed next year, it could provide a fresh warning about the fate of the saltmarsh sparrow population. Experts have estimated it's declining 9% a year. If that's so and it continues, Longenecker said, "we could see a pretty substantial population collapse within 50 years."

Biologists hope the survey results can guide (and possibly goad) them as they attempt to rescue the birds from oblivion. Slashing emissions of climate-warming greenhouse gases would slow the rise in sea level and give tidal marshes more time to migrate inland or raise elevation.

Conservation plan

But that's far from certain and could take decades. So, a conservation plan has been developed by the Atlantic Coast Joint Venture, a partnership of state and federal wildlife agencies and conservation groups working to save this and other native bird populations on the Atlantic Flyway.

The plan lays out a menu of stopgap measures, some relatively untried, to restore some of the marsh habitat that's been lost and to give the birds more room to nest. One potentially fruitful effort would be to try to undo or remedy the widespread ditching of the marshes that took place decades ago, either for farmland drainage or to control mosquitoes. The ditches have trapped water in the marsh and prevented

it from building itself up with new deposits of sediment. The resulting marshscape is like a waffle pockmarked with pools of water — unsuitable now for ground-nesting birds.

The plan proposes "runneling" or digging little shallow ditches to drain those pools. Another option, tested so far in a couple New England states, involves cutting marsh hay and rolling it into the ditches, where it can trap sediment and over a period of years naturally fill in the open water. Yet another, quicker approach that is more expensive and logistically complicated has been tried at Blackwater National Wildlife Refuge. It involves pumping a thin layer of river sediment onto a low marsh to raise its elevation.

Promising as any of those might be, experts say it's not clear how much can be done, or how quickly, or what the costs would be.

"No doubt it is a formidable challenge," said Aimee Weldon, a USFWS biologist who helped write the plan. "We're trying to react to sea level rise and other impacts on a very shortened time scale, trying to learn as we go as quickly as we can. Our focus right now is getting as much habitat on the ground as we can."

The plan acknowledges that the saltmarsh sparrow numbers are likely to keep falling over the next decade and by 2030 could drop to a critical threshold of 10,000 birds. But the plan aims by then to have 23,000 acres of high-quality breeding habitat to halt the slide and then slowly rebuild the population to around 25,000 by 2069. To do that, they estimate they'll need more than three times as much marsh habitat — 80,000 acres.

"It can be a pretty dire feeling," Weldon acknowledged, "but we still believe that there's hope — if not for the saltmarsh sparrow then for the other birds that aren't quite as affected. ... We are hoping to rapidly learn about the restoration techniques that work and then scale up."

Meanwhile, at the end of their morning in and around Fishing Bay, Reifenberg and Tran had tallied sights or sounds of three swamp sparrows, seven seaside sparrows (including one that flew closer to check out the recorded come-ons), two Virginia rails (one of which also ventured closer), nine marsh wrens and several other birds.

Plus, they had confirmed two saltmarsh sparrows. That seemed encouraging. But then again, Fishing Bay is the bird's stronghold in the Chesapeake, according to earlier survey data.

"You sample eight points a day for five days, and you see maybe one saltmarsh sparrow," Reifenberg said. "And some days, you don't see any at all." ■

Progress on environmental justice draws criticism in MD

Advocates want faster action to help protect communities

By Jeremy Cox

In Virginia, the state environmental agency this spring created an environmental justice office, tasking it with developing a plan to address systemic inequities in the sector.

New Jersey lawmakers last year passed legislation requiring reviewers to deny permits for new industrial facilities if the surrounding community is already saddled with too many other sources of pollution. Supporters dubbed it the “holy grail” for the environmental justice movement.

That same year, the state governors and federal agency heads overseeing the Chesapeake Bay restoration effort took a historic leap forward. By signing onto the partnership’s first diversity and equity plan, they committed to actions to root out injustices in the cleanup as well as within their own organizational structures.

Environmental justice initiatives have been making strides in states across the country. But in Maryland, EJ advocates are frustrated by what they say are comparatively small steps taken by the Democratic-controlled legislature and Republican Gov. Larry Hogan.

More than a year after Hogan pledged Maryland’s support for the Chesapeake Executive Council’s historic agreement, all sides seem to agree that environmental justice has at least inched forward inside the state government. But advocates say the push has lacked focus and, at times, undercut its own goals.

For example, they say, the Maryland Department of the Environment, the logical epicenter of the effort, posted an EJ “policy and implementation plan” last December but didn’t seek public comment before doing so.

“I felt like they went into a room and shut the door and came up with a plan they felt was right instead of meeting with stakeholders,” said Darya Minovi, policy analyst with the Center for Progressive Reform, a left-leaning advocacy group that has sought to pass EJ legislation.

And activists were largely disappointed earlier this year when lawmakers could only muster enough support to approve one EJ-related bill during their spring session.



Monica Brooks led a successful effort to prevent 13 poultry houses from being erected on this land in Wicomico County, MD. Brooks, now a member of the state’s Commission on Environmental Justice and Sustainable Communities, was among local residents concerned about the impacts of air pollution from the houses. The fields now grows sunflowers, sod and organic produce. (Dave Harp)

The legislation overhauled the state’s Commission on Environmental Justice and Sustainable Communities by broadening its membership, expanding its duties and requiring it to hold more meetings.

The changes didn’t go into effect until Oct. 1. In the meantime, environmentalists grumbled that three commission seats had remained open for months even though replacements they considered to be qualified had applied for the positions. The openings included slots for an environmental organization representative, a second health expert and a third resident of an affected community.

In sum, Maryland has taken a piecemeal, scattershot approach to EJ, activists say.

“I think they mean well. I don’t detect any specific animus,” said Fred Tutman, the Patuxent Riverkeeper and one of the state’s fiercest EJ champions. “But within the culture of state government, they’re trying to figure out how this environmental justice stuff fits in with their usual behavior.”

‘Totally dysfunctional’

For decades, activists and social scholars have raised alarms that government actions, from the permitting of polluting industries to the enforcement of environmental statutes, tend to put impoverished and minority communities in harm’s way. Their

concerns led in 1994 to the first major federal EJ policy, an executive order by President Clinton requiring all agencies to tackle environmental inequities.

Maryland got the jump on its counterparts when Gov. Parris Glendening issued an executive order of his own in 2001, creating the state’s EJ commission. Virginia’s equivalent wasn’t formed until 2017.

But the commission languished for years, meeting infrequently and accomplishing no major reforms. Its inaction prompted a diverse group of environmental organizations to write to Hogan in August 2020, urging him to reorganize the panel and commit all state agencies to develop and follow EJ plans.

“That commission has been totally dysfunctional since after about the first year,” said Kathy Phillips, executive director of the Assateague Coastal Trust and the letter’s lead author. “It wasn’t putting out the reports it needed to put out. It was basically just a set of minutes from the meetings.”

The last straw, Phillips said, was the revelation that one of the commission’s two seats reserved for impacted communities was being occupied by Steve Levitsky, an executive with Perdue, the Salisbury-based poultry giant.

“That pretty much outraged people,” she added. Among the letter’s eight other signers were Tutman, the Riverkeeper;

Sacoby Wilson, director of the University of Maryland School of Public Health’s Community Engagement, Environmental Justice and Health Lab; and Mary Ashanti, then-president of the Wicomico County NAACP.

This spring, state lawmakers responded by passing a bill rechartering the EJ commission, starting with its work schedule. No longer will the commission’s meeting dates be set by its chairman alone. Going forward, according to the law, it must convene at least six times a year and host at least four community “listening sessions.”

The law also repeals criteria requiring the commission to assess whether any communities are experiencing environmental injustice — that’s already well-established, advocates say. Instead, it empowers members to recommend actions to the General Assembly.

“I think it was a step forward,” Wilson said. In the past, he noted, “there were a lot of meetings and no action. It was all decisions about ‘What is an environmental justice community?’”

As of Oct. 1, the commission’s membership turned over completely. The political center of gravity shifted as well, with the governor’s appointment power cut in half, from 12 to 5. The legislature will have at least 17 of its own slots to fill.

The membership must represent the racial, ethnic and geographic character of the state, the law specifies.



Maryland’s environmental commission organized an August visit to the Eastern Shore to learn about large chicken farms that have raised concerns about air and water pollution. Left to right: MDE Deputy Secretary Horacio Tablada, MDE Secretary Ben Grumbles and Delegate Regina T. Boyce. (Courtesy of Maryland Department of the Environment)

A plan, then progress

MDE Secretary Ben Grumbles said he had no qualms with the bill reorganizing the commission. “The criticisms resonated with us that the commission was not engaging enough and that the recommendations were sporadic,” he said. “So, we agreed with the spirit of the legislation.”

Although not mandated by the law before Oct. 1, the commission has been meeting more regularly this year. Its website reported six meetings through September and three more scheduled through December. And in August, several members trekked to the lower Eastern Shore to visit factory-scale chicken farms that critics say are polluting the region’s air and drinking water.

“The commission is much more active [now] than over the past decade,” Grumbles said.

Grumbles said his agency has begun implementing many of the recommendations contained in the EJ plan developed by his staff late last year. Among the most notable actions has been MDE’s appointment of an EJ point person: Devon Dodson, a senior adviser to Grumbles and former acting director of the Maryland Energy Administration.

The agency has also created an internal workgroup consisting of top officials from each division, Grumbles said. The group’s job is to develop procedures for advancing EJ in the department’s day-to-day activities. One of his top priorities, he added, is to improve communication with communities ahead of tough permitting decisions.

He cited the example of the agency’s air division hosting additional public meetings to gather input on a crematorium proposed by Vaughn Greene Funeral Home in Baltimore. The project has triggered outcry over concerns that the facility will pollute the air, damaging residents’ health in Black communities.

“It’s a greater outreach to the community before we even begin the public meeting process,” Grumbles said.

Becky Witt, a Community Law Center attorney representing the opposition, was impressed that MDE allowed participants to vent for as long as they wanted. The meeting lasted three hours. But she wondered whether it had made a difference.

“In my experience working with communities,” she said, “just because you have a meeting where people can come and tell you things, it’s not particularly useful unless you can use that information in the final decision.” Otherwise, “it feels a little hollow.”



Dr. Sacoby Wilson of the University of Maryland speaks about environmental justice after receiving a 2021 environmental leadership award from the Maryland League of Conservation Voters. (Brian O’Doherty)

Cumulative impacts count

Under the new law, the EJ commission is tasked with consulting mapping tools and other data sets to analyze how permitting and enforcement decisions affect overburdened communities. In a small but critical victory for advocates, the law specifically allows the group to study “cumulative impacts.”

The provision hints at the true prize for Maryland advocates: a law that mandates a permit to be rejected if it would pose environmental or health risks in low-income or minority communities already mired in pollution. New Jersey passed such a measure, the first of its kind, earlier this year.

“We encourage policymakers in Maryland to follow the lead in New Jersey and pass legislation that provides meaningful cumulative impact analysis in the department’s decision-making capacities,” said Evan Isaacson, a Chesapeake Legal Alliance attorney.

Such a strong environmental law would likely face vigorous pushback from development and industrial groups. A preview of the opposition came during debate over the commission overhaul bill.

Amid the pandemic and other troubling economic signs, said Marshall Klinefelter, president of the Maryland Asphalt Association, in written comments to lawmakers, “we must focus our resources on the most pressing issues like our crumbling roads and highways, improving public transit options, and addressing economic disparities

within Maryland. We believe it is paramount to address the problems at hand before they are inadvertently exacerbated by misguided and burdensome legislation.”

Troubled recent past

The low point in Maryland’s recent EJ history came in 2016, when Black residents in the rural community of Brandywine in Prince George’s County filed a federal civil rights complaint over the state’s green light for a natural gas power plant in their midst.

The EPA forged a settlement in 2019 that stipulated corrective actions to be taken by three state agencies: the MDE, the Public Service Commission and the Department of Natural Resources. For its part, MDE was required to make certain air-quality information publicly available, conduct more-thorough public outreach in future power cases and undergo organizationwide civil rights training.

Jay Apperson, an MDE spokesman, said the agency has fully complied with the settlement and received a release letter from the EPA confirming it.

Wilson, of the University of Maryland, said he would give Hogan an “F” on his EJ performance. In the wake of the last year’s letter criticizing the commission, the governor’s office was silent on the issue, Wilson said. He suggests that each state agency should have an office devoted to EJ, and it should factor into every employee’s performance evaluation.

“Right now, we have an imbalance,” he

said. “The industries have more power than the people do.”

Hogan’s office said the governor put his support into action with the adoption of the Chesapeake Executive Council’s EJ statement under his chairmanship. Hogan also stands behind the actions that the MDE has taken over the past year to address EJ concerns.

“Clearly, we need to give those efforts time to work before getting into progress reports,” Hogan spokesman Michael Ricci said. “As part of the implementation plan, we already have a designated official at each agency to provide coordination. Mandating that each agency expand its bureaucracy for this would likely slow down all of this work, and do more harm than good.”

Battle-tested fighter steps in

Advocates applauded the appointment of Monica Brooks to the commission earlier this year as an “affected communities” representative. After a Northern Virginia family proposed constructing 13 chicken houses near her home in Wicomico County in 2015, Brooks led a grassroots fight that ended with the family selling the land to a sod and organic produce farmer.

She stopped by the property in September and said that the currently fallow field had been resplendent a few weeks earlier with sunflowers. “Literally, people just stop here and take photos because it’s all sunflowers,” Brooks said. “It’s a much more beautiful landscape compared to what it could have been.”

But the battle isn’t over, she explained. She and other advocates are fighting for more widespread testing of air quality and private water wells in areas with high concentrations of chicken farms. Their main concern: nitrates, an agricultural pollutant linked to “blue baby” syndrome and cancers of the digestive tract.

A test of Brooks’ well water last spring showed nitrate levels slightly above 8 parts per million. The U.S. Environmental Protection Agency considers drinking water to be unsafe at 10 ppm and higher.

Brooks, who is Black, said she is encouraged by the sincere attitudes of many of her fellow commissioners. They want change. Now, she will be watching to see whether the state’s power hubs — the governor’s office and the legislature — will take the commission’s advice seriously.

“Part of environmental justice is being able to stand up to something that is truly unjust, to say, ‘This thing is causing me harm in my environment. And something should be done about it,’” Brooks said. “I don’t want to just scream into the wind.” ■

Chesapeake a 'sink' for microplastic pollution, model shows

Study finds most plastics in Bay waters stay there

By Whitney Pipkin

The vast majority of plastic pollution that makes its way into the rivers of the Chesapeake stays in the Bay and along local waters and is not, as researchers put it, “exported” to the ocean.

This was among the findings of a modeling exercise conducted by researchers from Pennsylvania State University with the help of the Virginia Institute of Marine Science. The scientists wondered why the amount of plastic particles entering the ocean appeared to be considerably less than what runs off of the land in places like the Bay watershed. What, they asked, is happening to the rest?

They suspected that the Chesapeake Bay — which has long been a swirling sink for other types of pollution — could be functioning as a catchall for plastics, too. But the conclusions still surprised them.

The model results indicated that about 94% of microplastics — particles measuring 5 millimeters or less in diameter — fed into the system via its rivers stayed in the system, most likely lingering on or along the shores. About 5% of the particles were carried from the Bay to the ocean and 1% remained suspended in the water column.

Half of these microplastics were deposited along shorelines within a week or two, and most washed up not far from where they first entered a tributary.

“We were expecting more export out onto the [Continental] Shelf,” said Alexander López, a postdoctoral researcher at Penn State and the study’s lead author. “No one talks about, ‘Oh, there’s so much plastic in the estuaries.’ They talk about ocean beaches. The fact that we saw so much retained in the estuary, we thought, ‘Hey, that’s significant.’”

Matt Robinson, environmental protection specialist for the District of Columbia’s Department of Energy and Environment and a co-chair of the Chesapeake Bay Program’s plastic pollution action team, said the study is relevant to the broader effort under way to better address plastic pollution in the watershed.

“The fact that stuff doesn’t get pushed out into the ocean — that we’re retaining plastic — is a big find,” Robinson said. “It potentially means there could be serious effects of plastic on Bay ecology.”

Nearly every survey looking for plastics in aquatic systems has found them. But researchers are just beginning to understand what that means for local habitats and species. This modeling study could help direct those efforts by pointing out where the bulk of small plastics are likely remaining.

Meredith Evans Seeley, a doctoral candidate at the Virginia Institute of Marine



A discarded Gatorade bottle floats near the Bay’s shore. Over time, plastic products like these disintegrate into vanishingly small particles, called microplastics, which are known to affect marine life. (Lara Lutz)

Science, said it definitely dovetails with the work she’s been doing.

Seeley’s research focuses on how microplastics impact the ability of organisms in estuary systems to do their jobs. Estuaries are where a lot of the action takes place, serving as nurseries for fish and crabs, regulating runoff from the surrounding landscape and cycling nutrients before they reach the ocean.

“All these organisms have different roles in the ecosystem, and if we add plastics and change what organisms are there, we’re changing the function they have for the environment,” she said.

A recent study by Seeley found that the presence of particular kinds of microplastics reduces the number of organisms that process certain nutrients, especially excess nitrogen, in coastal marshes. Nitrogen commonly enters water from the air, nearby agriculture or wastewater effluent. Too much can lead to severe imbalances in the local and regional system.

The presence of certain microplastics, in this case, made the habitat she was studying “less of an effective buffer against nutrient pollution,” Seeley said.

López’s modeling work, Seeley said, confirms their hunch that coastal marshes are likely recipients of large amounts of microplastics that enter the region’s waters. There are dozens of other variables to consider — how large the plastics are, what type they are, their buoyancy and the volumes that are present — which both researchers said points to the need for additional surveys

and monitoring to inform scientific work.

“We are trying to get more people to use this as a foundation to go out and collect more data,” López said.

The Penn State model could also be better informed as more data is available. The model used 5 millimeters as the fixed size for microplastics, but in the real world anything between 1 micron and 5 millimeters in size would be considered a microplastic. When it comes to how far a plastic particle travels and where it is deposited, buoyancy seems to be more of a determining factor than size. Items that float travel farther, while ones that sink stay closer to the source.

López said the research included running the model in a range of years with more or less rainfall than the main year of study, 2010, but those variations didn’t dramatically alter the findings. The model also didn’t take into account the number of microplastics that might be ingested by fish or other animals.

In its first run, the model assumed similar loads of microplastics were entering each of the Bay’s major river systems. But a 2014 survey already found a correlation between urban areas of the Bay and higher loads of microplastics.

Still, these preliminary findings indicate that the Bay’s ecosystem could be bearing the brunt of microplastics that enter it, rather than conveying the bulk of them to the ocean. ■



These microplastics from the Corsica River in Maryland were photographed at a laboratory at the University of Maryland’s Department of Environmental Science & Technology. (Will Parson/Chesapeake Bay Program)

MD, PA find ‘forever chemicals’ in many drinking water sources

Some water systems have PFAS levels above EPA health threshold

B Timothy B. Wheeler

Toxic “forever chemicals” are turning up in more and more places as the federal government joins a growing number of states, including Pennsylvania in the Bay watershed, in moving to regulate at least some of them.

PFAS, or per- and polyfluoroalkyl substances, have been detected in more than 75% of community water systems tested so far in Maryland and in nearly 40% of drinking water samples analyzed in Pennsylvania, according to data from both states.

The surveys found two water systems in each of those states with PFAS levels higher than the U.S. Environmental Protection Agency’s health advisory threshold.

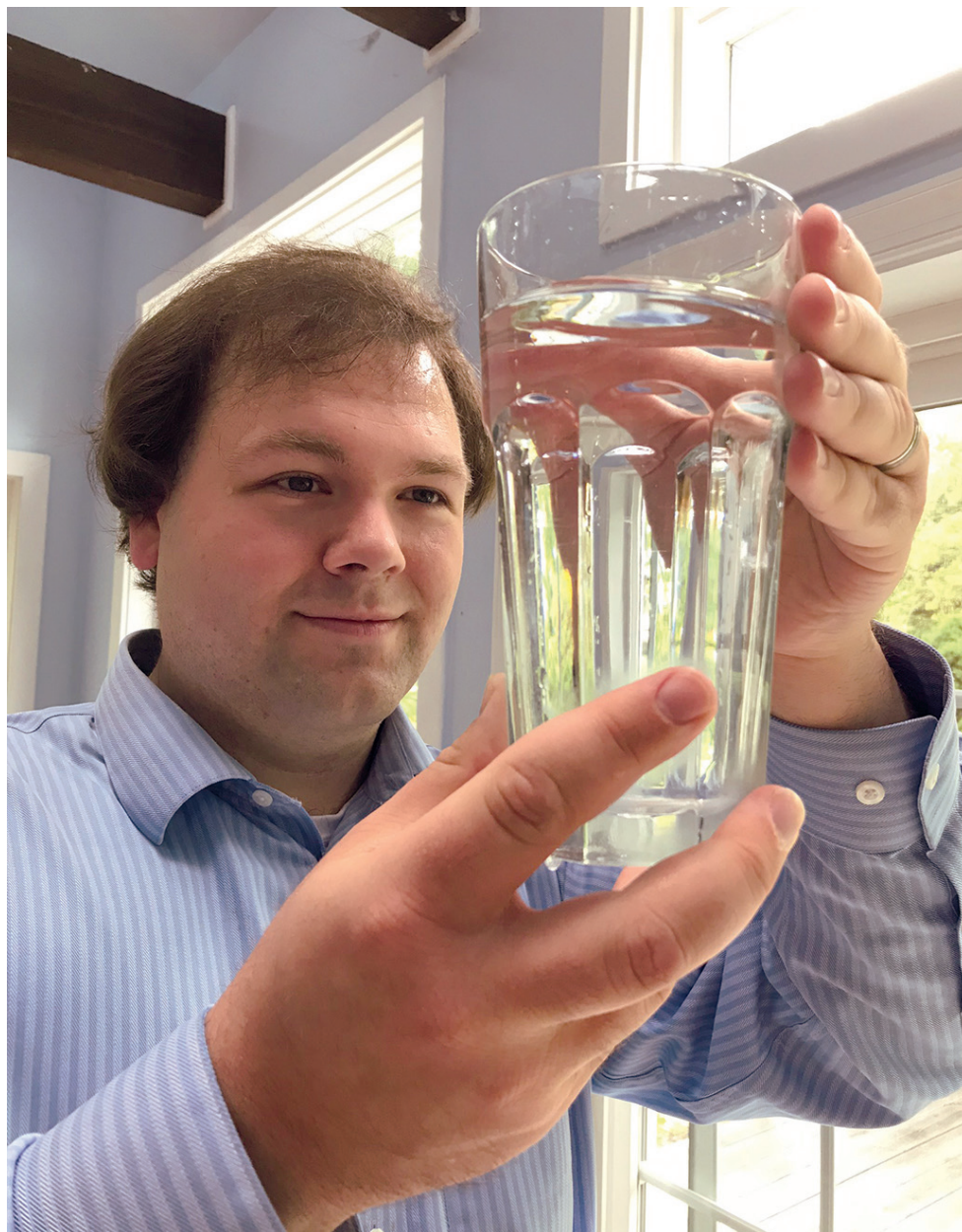
PFAS are a group of more than 9,000 highly persistent chemicals, many of them toxic, which have been in wide use since the 1940s. They are found in everyday consumer products such as nonstick cookware, pizza boxes and stain repellants. Their use in fire-fighting foams, though, has resulted in widespread PFAS groundwater contamination around airports and military bases nationwide.

The Maryland Department of the Environment has tested 129 water treatment plants statewide since 2019. Those plants, chosen because of their proximity to potential PFAS sources, furnish drinking water to 4.3 million residents, or 70% of Maryland’s population.

The MDE said levels above the EPA threshold were detected in treatment plants furnishing drinking water to 18,600 residents of the city of Westminster and 6,300 residents of the town of Hampstead, both in Carroll County.

After confirming the initial results, state officials ordered the wells with high PFAS levels supplying water to those systems be taken offline. Investigators have yet to pin down the contamination sources, but Denise Keehner, an assistant MDE secretary, noted that there is a fire training facility near the Hampstead well.

In Pennsylvania, the Department of Environmental Protection sampled 372 large and small water systems, including some serving private businesses, that were near sources of contamination. Another 40 baseline



Nathan Volpi paid to have the tap water in his York County, PA, home tested in 2016 and learned that it contained high levels of PFAS. (Timothy B. Wheeler)

samples were taken from systems not close to known or suspected PFAS sources.

One site with results higher than the EPA’s guideline was a municipal water system serving about 1,500 residents of Saegertown, north of Pittsburgh. In Saegertown, system operators identified and curtailed use of a well with high PFAS levels, said Lisa Daniels, drinking water bureau director for the DEP.

The other came from a well furnishing drinking water to State of the Art, Inc., an electronic components manufacturer in State College with more than 100 employees, according to the company website.

State officials have yet to identify the sources of PFAS in either case, but the State College factory is located near the

municipal airport, which has used PFAS-laden firefighting foam.

Prodded by its legislature, Virginia’s Department of Health has been tasked with sampling drinking water from up to 50 water supplies and waterworks for six PFAS compounds. The department is required to report the results by Dec. 1.

Certain PFAS can accumulate and stay in the human body for long periods of time. Studies using lab animals have linked exposure to high levels of PFAS with a variety of health problems, including liver and immune system damage, birth defects and increased risk of cancer.

Even so, there are no enforceable federal standards limiting how much is safe to consume in drinking water. In 2016, the

EPA set an advisory level of 70 parts per trillion for either or both of just two of the more thoroughly studied compounds, perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA).

States usually rely on federal agencies to regulate exposure to harmful chemicals, often because they lack the technical expertise, laboratory capacity and other resources to make such determinations. But with the EPA taking years to act on PFAS, at least 22 states have taken steps to limit several of the compounds in their drinking water, according to the Environmental Council of the States. Seven states, including New York, have set or proposed their own enforceable maximum contaminant levels, while 10 others have advisory guidelines.

In Pennsylvania, which has been grappling with multiple cases of PFAS contamination in community water systems, the Wolf administration had vowed two years ago to begin the process of setting its own health-based limits on PFAS in drinking water. In June, the state Environmental Quality Board approved the DEP’s recommendation to proceed with setting a maximum contaminant level for PFOA. The department plans to propose that level later this year, according to DEP spokesman Jamar Thrasher.

Maryland officials say they intend to keep looking for sources of PFAS contamination in the state and focus on reducing exposures while leaving the standard setting to the federal government. The MDE’s Keehner said the EPA appears to be “moving pretty quickly” to assemble the latest scientific data to provide a legally defensible basis for limiting PFAS in drinking water.

Earlier this year, the EPA declared its intent to regulate levels of PFOA and PFOS in drinking water, but it will take a year or more to actually set maximum safe levels. The agency also has announced plans to regulate PFAS in wastewater discharges from certain industries — a potential source of drinking water contamination.

Congress could require even more aggressive steps. In July, the House passed the PFAS Action Act, which would require the EPA to regulate PFOA and PFOS in drinking water and set deadlines for determining whether to treat those and many of the other compounds as “hazardous substances” subject to mandatory cleanup under the federal Superfund law. The measure faces an uncertain future, though, in the closely divided Senate. ■

Communities use MD grants to improve climate resilience

New living shorelines, wetlands to address flooding, erosion

By Timothy B. Wheeler

Until recently, the West River United Methodist Center had a problem. The 45-acre retreat and camp facility in Shady Side, MD, south of Annapolis, has a mile of waterfront on a popular Chesapeake Bay river. But there was no beach to speak of, with limited access to the water for swimming or wading.

Much of the shoreline had been armored long ago against erosion, once a common way of dealing with the loss of valuable waterfront. But after decades of buffeting by wind-driven waves, the wooden bulkhead was failing, and the land behind it was washing away.

“So work was going to need to be done, one way or another, on it,” recalled Chris Schlieckert, the center’s director.

Then Dave Coomes, the center’s maintenance director, met Claudia Donegan, who works on community-based restoration projects with the Maryland Department of Natural Resources. She helped to persuade the staff to try a more ecologically friendly type of shoreline protection. The nonprofit Alliance for the Chesapeake Bay pitched in to help the center apply for — and get — a \$1.2 million grant from the DNR.

The result is an 885-foot “living shoreline” with a cobble beach to replace the crumbling bulkhead. There’s also a newly engineered wetland to capture stormwater runoff, where shrubs and plants can soak up some of the collected rainfall.

The project is the first of 22 projects, funded to date by the DNR under a “resiliency through restoration” initiative launched in 2017, to break ground. Its aim is to help communities and individual landowners adapt to the threats to property and life posed by climate change.

“We work with local communities to provide funding for them to better understand their flood risk and their climate risk and also to address that risk,” said Nicole Carlozo, a resiliency planner in the DNR’s Chesapeake and Coastal Service.

Maryland, with more than 7,000 miles of Bay and Atlantic Ocean shoreline, is the fourth most vulnerable state in the nation to the impacts of rising sea level, a main impact of climate change. Shorelines,



A wooden stake marks where a dune will be constructed to help protect the swimming beach and nearby road along the Tred Avon River in Oxford, MD. Vegetated islands are to be installed just offshore to buffer the shoreline from wave erosion. (Dave Harp)

especially in low-lying areas, are experiencing more pounding from storms but also more frequent and severe tidal flooding — even on sunny days.

Five years ago, with funding from the National Oceanic and Atmospheric Administration, the DNR collaborated with The Nature Conservancy to produce a coastal resiliency assessment, a tool to identify residential areas impacted by coastal hazards and to rank shorelines by their value for conservation and restoration. That has helped the DNR evaluate proposed projects for funding.

Most of the grants awarded so far are to install living shorelines, Carlozo said, but the DNR is broadening its approach to support work that often addresses more than one issue. After the devastating flash floods in Ellicott City in 2016 and 2018, she said, the department also began funding projects that help mitigate storm-driven flooding farther inland. As a result, Hyattsville in Prince George’s County received a grant to identify places where “green infrastructure” such as rain gardens, permeable pavement and wetlands, could reduce harmful flooding.

The DNR also tries to include the restoration of fish or wildlife habitat in the projects it funds, Carlozo said.

“The idea here is to showcase different types of projects and how they work,” she said, “so communities and landowners will want to replicate those types of projects.”

Interest in the grants has stretched the initiative’s resources. When it was first

launched, state officials budgeted \$16.55 million for 16 projects, but six have been added since then.

Next to break ground is a project at Deal Island on the Eastern Shore. An area known as Hunt’s Hill has been eroding since the 1970s, wiping out dunes as the shoreline retreats. Begun this summer, in collaboration with Somerset County and other stakeholders, it will try to mimic the remaining dunes.

One of the most ambitious projects is in Oxford, also on the Eastern Shore. To lessen increasingly frequent flooding, the town will build up a low sand dune along a swimming beach on the Miles River.

“Seven or eight times a year, they’re getting these high-tide flooding events that are not even related to a storm,” said Amanda Poskaitis, coastal resilience program manager at the National Wildlife Federation. The DC-based environmental group has partnered with the DNR and the town to design and fund the work. Sometimes, Poskaitis said, the flooding blocks a road that is the sole access to several waterfront homes, and those residents can’t get in or out.

The project will include a trio of “living breakwaters” — small, vegetated islands — a short distance off the beach to dampen wave energy and storm surge.

“I would describe it as utilizing natural features to protect a shoreline,” Poskaitis said, “incorporating sand and marsh habitat — not just armoring it with a bulkhead or seawall.” There will be some rocks placed to provide stability, but it will be done “in a

unique way,” she added.

“We’re excited to see a concept design that incorporated as much living material, vegetation, as possible,” the DNR’s Carlozo said. The project planners and the engineering firm chosen to design the project, Underwood & Associates of Annapolis, have consulted closely with town officials and residents to strike a balance between ensuring continued recreational use of the beach and protecting the shoreline, she said.

With assistance from the National Wildlife Foundation and a commitment of matching funds from the DNR, the town applied to the National Fish and Wildlife Coastal Resiliency Fund to construct the beach portion of the design. Counting the match, total funding is \$2.8 million. Construction is still some time off, as the project must go through regulatory review and gain permits.

Even so, it only addresses one of several flooding threats in Oxford, Poskaitis noted. More will be needed, but she said, “it’s a first step.”

Meanwhile, in Shady Side, the Methodist retreat center’s director said its shoreline makeover is already paying dividends.

“We’re trying to help people connect with nature while they’re here,” Schlieckert said. “Removing the bulkhead and creating a place where people can really access the water is just going to be phenomenal for our mission and ministry, using creation to help people connect with God ... So, it’s pretty remarkable.” ■

Marsh value surges as rising water, storms combine forces

Loss of natural buffers could cost billions in damage from hurricanes

By Jeremy Cox

Climate experts have long warned that rising seas could add more destructive power to hurricane-whipped storm surges. But a new study centered on the Chesapeake Bay region suggests that another potential consequence of climate change could make that flooding even more devastating.

Large swaths of the marshes that stand guard along the coasts of Maryland and Virginia are expected to disappear beneath rising water by 2100. That loss will rob many low-lying communities of a critical natural buffer that protects them from storm surges, the wind-driven pulse of water that often causes widespread flooding during hurricanes.

New research, led by scientists at George Mason University in Virginia, details for the first time the possible human and economic toll of that one-two punch of sea level rise and marsh loss.

The bottom line: A strong storm could inflict billions of dollars in additional residential damage by the end of the century than the same storm would today. And hundreds of thousands more residents would likely experience flooding, according to the study.

Some cities are already investing in expensive flood-control measures, such as higher sea walls, but the new research demonstrates the effectiveness of a comparatively low-tech solution, said Margaret Walls, one of the study's authors and a senior fellow at the Washington, D.C.-based nonprofit Resources for the Future. For instance, preserving higher land adjacent to marshes can give the plants somewhere to "migrate" as water rises, a conservation measure gaining traction around the Bay.

"If we have a loss of wetlands, then we have lost that protective service that those wetlands provided," Walls said.

The study simulated the impacts that two real-life hurricanes would trigger in a hypothetical, climate-changed world.

Standing in for the "strong" storm was Hurricane Isabel. The 2003 storm stirred up 65 mph sustained winds and up to 8 feet of storm surge as it swirled into the Chesapeake, making it one of the fiercest hurricanes to slam into the region. For their



A study from George Mason University reports that the amount of marsh around the edges of the Chesapeake Bay could decrease from covering 18% of the shoreline today to 13% by 2100. (Dave Harp)

"weak" storm, the researchers chose 1999's Tropical Storm Dennis, which hit with 40 mph winds and a peak storm surge of 3 feet.

The team's computer models suggested that a storm identical to Dennis in 2100 would generate more flooding and property damage than the more-powerful Isabel of today.

"Measly Dennis will become like Isabel in the future," Walls said. "It's exactly that storm, but because of sea level rise and fewer wetlands on the landscape, it causes more damage."

In a worst-case scenario, in which the more powerful Isabel struck a Chesapeake with water levels 7.6 feet higher than today at the end of the century, the region would suffer billions of dollars in damage and potentially leave 2 million people flooded.

But a climate scientist not involved said that the study overestimates the damage. Don Boesch, retired president of the University of Maryland Center for Environmental Science, said that in the year-plus interim between when the study was completed and when it was published, new

research has refined sea level rise estimates for the Bay region. (Boesch also serves as a member of the *Bay Journal's* Board of Directors.)

Projections from the latest United Nations report on climate change released this summer puts the worst-case sea level rise projection for 2100 at a little more than 4 feet in the lower Bay — not the 7.6 feet worst-case model adopted by the George Mason researchers. It pegs the most likely amount of rise around the Bay at about 3 feet by the end of the century.

"The result is that while the authors' conclusions about the increase in damage are directionally right, the quantitative differences are greatly exaggerated," Boesch said.

Still, even the George Mason paper's low-end sea level rise estimate of 2 feet, which is less than the new projection, predicts that the amount of wetlands around the edges of the Bay will decrease from covering 18% of the shoreline today to 13% of the area by 2100.

"The marshes provide friction," said Celso Ferreira, a civil engineering professor

at George Mason who worked on the study. "The plants themselves attenuate wave energy."

With sea level rise alone, the total area flooded from storm surge would increase by 25% from a strong storm of today, the authors wrote. And what if marsh loss is calculated into the model? In that case, 40% more land will be inundated than now, their research shows.

"The big significance of the study is that, under our current management of coastal lands, we are likely to find future storms to be quite costly," said Molly Mitchell, a coastal ecologist with the Virginia Institute of Marine Science, who wasn't involved with the paper. "What the study doesn't address, but must be part of the conversation moving forward, is how we can mitigate these future costs through collective and individual decision-making."

As the paper suggests, preserving natural coastal features could make a big difference, Mitchell said.

The study puts the economic value of marshes in stark terms. A strong, Isabel-like storm today could cause \$684 million in damage across the region, it stated. Accounting only for the impacts of 2-feet of sea level rise, the researchers estimated that a strong storm would cause about \$1.4 billion in damage by 2100.

When they accounted for the acreage of marsh expected to be gone by 2100, the tally swelled to \$2.5 billion.

In their worst-case scenario, the figure could jump to \$13 billion and flood 2 million people.

The paper focused on the Maryland and Virginia counties touching the Bay or the tidal portions of the rivers that spill into the estuary. Because of the difficulty with valuing commercial and industrial properties, it calculated only residential damages, Walls said. The costs would be higher by untold billions of dollars if all types of development were considered.

The findings, Walls said, point to a future of painful choices for cities and states.

"Are you going to ask people to move? People are going to gradually move. That has happened in the Gulf Coast. You're going to have to have some retreat from these areas," she said. "I just think these are some of the hardest decisions in the climate [change] space." ■



MD's Zekiah Swamp draws you in, welcome or not

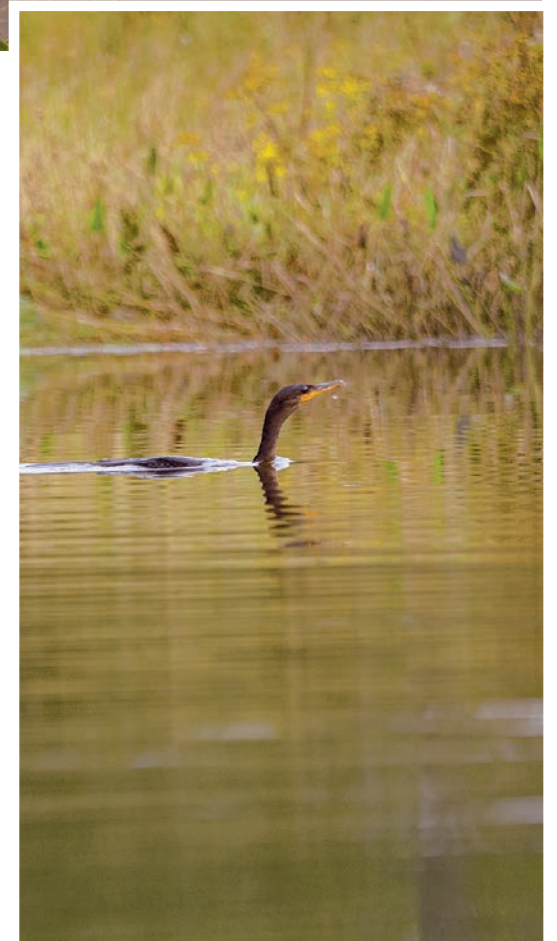
By Ashley Stimpson

I know when I'm not wanted. And standing there, at the end of a crater-pocked boat launch, watching water — far deeper and faster than I had expected — surge by, I felt distinctly unwelcome.

The derelict launch and hostile current were merely the latest in a series of obstacles standing between me and my plan to paddle the Zekiah Swamp, the largest hardwood swamp in Maryland. In the days leading up to my trip, I had struggled — and failed — to gather a companion or a kayak. The Patuxent Riverkeeper had come through last-minute on the latter, but I arrived at the mouth of the swamp on my own. Preceding me by a day were a couple of inches of rain courtesy of Hurricane Ida, which had spawned downpours, flooding and tornadoes in mid-Atlantic states.

As I defiantly cinched up my life jacket, I couldn't help but smile. After all, this is what had drawn me to the swamp in the first place: its remoteness, an attribute responsible for the Zekiah's rich biodiversity and colorful folklore. Historically, people didn't come to the swamp to relax or recreate; they came here to escape, to disappear. Out here, inaccessibility was kind of the point.

The Zekiah Swamp is a 21-mile system of braided streams that winds through the heart of Maryland's Charles County, from Cedarville State Forest to Allens Fresh Natural Area, where the Zekiah's thick bottomland forests give way to the wide horizon of the Wicomico River, just past Maryland Route 234. This is where, if you don't blink, you'll locate that boat launch, via a tortured dirt path tucked between two bridges just east of US 301. (Much of the land surrounding the length of swamp is private, and, while rustic, this launch



Top photo: A Maximillian sunflower grows along open water in Maryland's Zekiah Swamp. (Dave Harp)

Right photo: A cormorant cruises the Zekiah Swamp in Charles County, MD. (Dave Harp)

is the public route to the water.)

Here's what you won't find at Allens Fresh, part of the 443-acre Zekiah Swamp Natural Environment Area owned by the Maryland Department of Natural Resources: access roads, campsites, parking lots, picnic tables or restrooms. There are no hiking trails, either.

But, if you can manage to get your paddles wet, here's what you will find waiting in the swamp's muddy reaches: birds, including flamboyant species like the prothonotary warbler, scarlet tanager and red-headed woodpecker. And there's rare flora, like Long's bittercress, an inconspicuous plant in the mustard family whose flowers don't have petals. There are fewer than 100 known populations of this petite green worldwide, and the one at Allens Fresh is among them. Another rare wetland flower, the spongy arrowhead, also grows in the swamp. Trees like sweetgum and swamp rose peer down into the swirling brown water, where turtles, beavers and otters swim laps.

As I huffed and puffed and ugly-paddled my way upstream, I thought about the descriptions I had come upon over and over in my research. The Zekiah Swamp, everyone seemed to agree, is one of the most important ecological areas on the East Coast and one of the least disturbed in the Chesapeake Bay watershed.

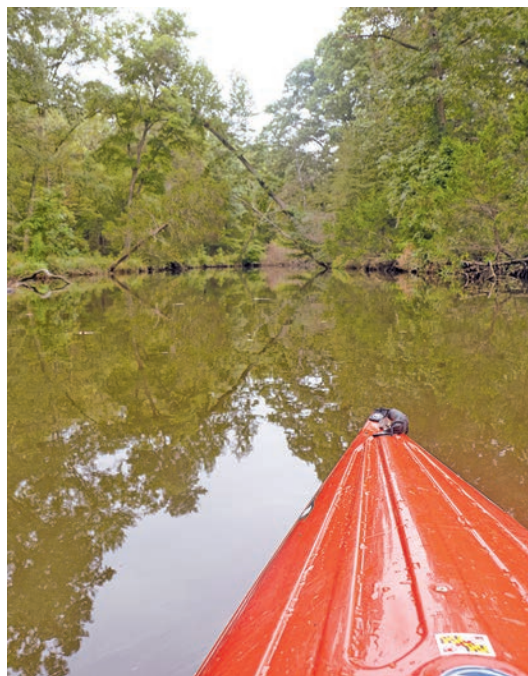
It's also a fabulous place to get lost.

Of course, I wasn't the first person to have this thought, not by a long shot.

In the last two decades, archeologists have combed through the swamp, recovering artifacts from the 1500s and 1600s that suggest the Zekiah Swamp was an important refuge for the inhabitants of the young Maryland colony. In 2009, an excavation team from St. Mary's College found buried vestiges — bricks, ceramics and pipe stems — of Charles Calvert's summer home, which he built in 1674 and called "His Lordship's Favor."

A couple of years later, the team made another exciting discovery, turning up artifacts from Zekiah Fort, a Piscataway settlement that archeologists had been trying to find for nearly 100 years. Calvert, as deputy governor of the colony, ordered the fort built in 1680 to resettle hundreds of Piscataway Indians and protect them from the invading Susquehannock. When the Piscataway deserted the fort 12 years later, they left behind pottery, glass beads and arrowheads fashioned from English brass, which remained interred in Zekiah's fertile soil for more than 300 years.

In a press conference after the discovery, Piscataway Chief Billy Redwing Tyack said that his people "were persuaded to come to the area for safety and refuge that was never given," and he hoped that the investment in and excitement around the fort would signal a "new era" in the relationship between the state and the contemporary tribe.



Perhaps the most infamous men to have sought refuge in the swamp were John Wilkes Booth and his coconspirator, David Harold. Hours after the assassination of Lincoln, Booth and Harold arrived at the home of Dr. Samuel Mudd, who lived in a handsome white farmhouse adjacent to the Zekiah Swamp. After Mudd set Booth's broken leg, the two fugitives disappeared into the swamp.

Today, the Mudd House is on the national register of historic places and a working museum. This fall, it is once again offering outdoor walking tours so that visitors can follow Booth and Harold's footsteps across the home's farm fields and 200 yards into the swamp itself, according to Bob Bowser, the acting president of the Dr. Samuel A. Mudd Society. Even this short walk allows visitors to see "just how difficult it would have been, in the dark, on horseback," to navigate the tangled vegetation of the swamp — so much so that Booth and Harold became hopelessly lost less than a quarter mile into their journey.

The tour relies on the accounts of soldiers from the 22nd Colored Infantry, who conducted an exhaustive search of the area days after the assassination. Some reported walking out of the swamp covered in mud up to their necks.

Bowser said anyone interested in the two-hour tour should keep an eye on the Mudd House's social media pages, where events are posted and updated frequently. (If experiencing the swamp on dry land appeals to you, another place to do it is in Cedarville State Forest, where hiking trails and roads crisscross its headwaters.)

Some of the swamp's lore is heavier on fiction than fact, and no Zekiah Swamp legend is more famous than Goatman.

Usually described as half man and half goat, Goatman's origins are as mysterious as his whereabouts. According to a 2015 *Washingtonian* article, some versions of the story say he is a



reclusive goatherd who became mentally unstable after some locals killed his goats; others posit that he is something akin to Bigfoot, a mythical creature said to roam the Maryland countryside. Other rumors insist Goatman was the result of the old tried-and-true experiment-gone-horribly-wrong thing at the nearby Beltsville Research Agricultural Center — a charge the U.S. Department of Agriculture has officially denied.

Goatman hysteria hit its peak when, in 1971, a local newspaper published a story about a Bowie family who claimed their dog was decapitated by a hulking, hairy creature that walked on two feet and made high-pitched squealing sounds. The story was picked up by the *Washington Post* days later, and "Goatman hunting" remains a popular pastime.

By the time I steered my kayak into the narrow channel of Zekiah Swamp Run, and the trees closed in around me, I was too out of breath to worry about Goatman, and I doubted he would be so blasé as to plod these parts at midday.

Instead, something nearly elusive as Goatman appeared at the bow of my kayak — a branch heavy with pawpaws. With the dignified restraint of Yogi Bear, I grabbed hold and began plucking the oblong fruit, storing it between my feet. Looking up, I realized I had paddled my way into another truly storied place: a pawpaw patch.

Satisfied with my haul, I glanced at my Fitbit. One measly mile. Somewhere nearby, a raptor cried. My arms ached. I studied my pile of pawpaws and felt the sting of rejection being soothed by the promise of pawpaw bread.

"OK, OK," I said to — I guess — the swamp. "I'm leaving."

On the way back to the launch, the current was so generous that I mostly kept my paddle on my lap. The swamp, it seemed, was escorting me out. ■

Left photo: A kayaker moves into one of the many winding channels in Maryland's Zekiah Swamp. (Dave Harp)

Right photo: After assassinating President Abraham Lincoln, John Wilkes Booth fled to Maryland's Zekiah swamp after stopping here to have Dr. Samuel Mudd treat his broken leg. Mudd's well-preserved home, adjacent to the swamp, is now a museum. (Dave Harp)



Paddle back in time, into nature in Susquehanna's Conejohela Flats

By Ad Crable

Summer was fading into autumn as my kayak glided into a labyrinth of wooded and grassy islands and exposed necks of mud — the Conejohela Flats in the lower Susquehanna River.

There may be no other place on the Susquehanna that surrounds you by so much nature and history as this compact string of islands, accessible only by boat just off the opposing shores of Lancaster and York counties in Pennsylvania.

The Conejohela Flats also are in the middle of the Susquehanna National Heritage Area, one of 55 such sites across the U.S. I was joined on my morning paddle by Zachary Flaharty, office manager of the Susquehanna National Heritage Area and author of a paddling guide to the flats.

The first channel we explored led to an inlet with an impressive raft of American lotus. Floating plates of lotus pads greeted us with a dash of whimsy before we paddled into the raised flowers. The flowers had already bloomed, but their seeds had not yet dispersed; gently shaking the saucerlike seed pods, we could hear the seeds rattling inside.

We extricated ourselves from the clingy water plants and shallow water by poling with our paddles. Then we glided over to a small island where the bright yellow flowers of bur marigold grew from a base of primrose, keeping the spirit

of summer alive.

In a tree above us, six great egrets, glowing white in the morning sun, stoically looked down on our wanderings. Migrating monarchs tipped their wings at us as the sun burned off the morning mist.

Flaharty said he is drawn to the flats by both the birding and the solitude.

“I just like how it is an escape,” he told me

before our trip. “It’s a different part of the river, and its little nooks and crannies appeal to me.”

Paddlers also appreciate the usually calm water. “It’s a calm space in an otherwise turbulent river,” said Marty Cox, owner of Chiques Rock Outfitters.

Following another small channel between islands, we emerged beside an expanse of mud



Top Photo: A great egret takes flight after stopping at the Conejohela Flats on the lower Susquehanna River. (Dave Harp)

Right photo: The pod of an American lotus flower on the Conejohela Flats still retains its seeds. (Dave Harp)

Bottom photo: The cluster of islands and mudflats in the lower Susquehanna River in Pennsylvania are rich in history and a vital stopover for thousands of migrating shorebirds. (Susquehanna National Heritage Area)

and barely submerged plants. These mudflats are an indispensable stopover for thousands of migrating waterfowl each spring and fall, especially shorebirds.

Their existence is one reason why the National Audubon Society has designated the Conejohela Flats as an Important Bird Area. Birdwatchers flock to the shores here, hoping to see some of the 37 species of shorebirds that stop to dine on bugs and rest on the mudflats during their migrations between the Arctic and southerly climes. An estimated 17,000 migratory shorebirds visit the flats each year.

Perhaps the most dramatic avian spectacle occurs when masses of tundra swans and snow geese descend on the flats in a sea of white.

It was too early in the season for the geese and swans show, but when we rounded a bend and came upon an extensive mudflat, I counted dozens of great egrets, great blue herons and cormorants, as well as flocks of Canada geese preparing to land. An osprey flew over, a bald eagle gave a high-pitched cry and a kingfisher made its presence known. We were awed.

The area is also full of history.

Though it remains markedly undeveloped, the landscape on both sides of the river here has certainly changed over time. The largest known village of the Susquehannock was once located just upstream of the flats, roughly where Washington Boro is now. In 1647, it had an estimated population of 4,000.

Both Native Americans in dugout canoes and European settlers used the islands as strategic spots to catch migrating American shad, an eagerly anticipated food staple each spring. The largest island in the flats is named Shad Island.

William Penn, founder of the Pennsylvania colony, wanted to make the small town now known as Washington Boro his “new” Philadelphia.

Penn envisioned the river as a major trade route, though it turned out not to be reliably navigable.

Disputes over productive spots, fishing practices and resentment over small dams built on the river and its tributaries led to sporadic violent conflicts between area residents from the mid-1700s until about the time of the Civil War. These came to be known as the Shad Wars.

A boundary dispute between the Pennsylvania and Maryland colonies also involved the flats. It simmered over time and occasionally erupted into violence between Maryland and Pennsylvania colonists — both laying claim to the area — in the late 1600s to nearly 1740. The actions of Thomas Cresap, a Maryland land agent, precipitated most of it, at least in the Pennsylvanians’ version of events. In Maryland, Cresap was considered something of a hero.

Construction of the Safe Harbor hydroelectric dam had the most dramatic impact on this stretch of the Susquehanna. Before the building of the dam in 1931, the river here — at the widest point of its 444-mile journey to the Chesapeake Bay — was shallow and rapid, foaming through rocks and boulders. The islands themselves were farmed.

With the building of the dam, water backed up and slowed down, flooding some of the islands. Other islands grew larger as silt coming downriver formed alluvial plains on their edges.

“From a paddling adventure’s standpoint, it is always changing, whether it’s floods or sediment buildup or the ever-changing water levels,” said Devin Winand of Shank’s Mare Outfitters. “Sometimes you can run a pontoon boat, and other times you can’t get a kayak through it.”

Decades ago, sediment wasn’t the only thing coming downstream with the water. Coal dust from Pennsylvania’s coal country far upstream washed down in such quantities that it was



Great egrets linger on an island in the Conejohela flats, its shoreline filled with bur marigolds. (Dave Harp)

vacuum-dredged by barges known as Pennsylvania’s Hard Coal Navy from the 1950s until the early 1970s. Look closely and you can still see streaks of fine black coal dust mixed into the mud.

As you paddle among the channels and shorelines, you will see assorted little huts made out of grasses and lumber tucked into inlets or on stilts in the river in places out of the wind.

These are active duck blinds, the continuing legacy of the area’s duck-hunting tradition. Until Hurricane Agnes in 1972 ripped out vast amounts of underwater grasses, the meadows here made this stretch of the river a magnet for migrating ducks, particularly canvasbacks. The numbers of ducks using the flats have never come close to the numbers seen before Agnes, but paddlers should still avoid the blinds during hunting season, from mid-October into January. ■



A kayaker negotiates the water between islands of the Conejohela Flats on the Susquehanna River. (Dave Harp)

If You Go

Several outfitters provide rental equipment, shuttles and guided trips to the Conejohela Flats.

- Chiques Rock Outfitters: canoe and kayak rental service and transport, 41 Walnut St., Columbia, PA. Explore on your own or on guided trips. Also pedal-paddle trips. Chiquesrockoutfitters.net, chiquesrockoutfitters1@gmail.com or 717-475-6196.
- KayakLanCo: equipment rental for self-guided paddling and pickup, Lancaster County, PA. Kayaklanco.com, info@kayaklanco.com or 717-945-8947.
- Shank’s Mare Outfitters: paddling tours and rentals of kayaks and stand-up paddleboards, 2092 Long Level Road, Wrightsville, PA. info@shanksmare.com, 717-252-1616.

BOAT LAUNCHES

- Blue Rock Boat Launch, Blue Rock Road, Washington Boro, PA (closest to Conejohela Flats).
- Zimmerman Center for Heritage, 1706 Long Level Road, Wrightsville, PA.

- Columbia Crossing River Trails Center, 41 Walnut St., Columbia, PA; Lock 2 Boat Ramp, 2112 Fishing Creek Road, Wrightsville, PA.

ATTRACTIONS A SHORT PADDLE OR DRIVE FROM THE FLATS:

- Zimmerman Center for Heritage, 1706 Long Level Road, Wrightsville, PA: Located in a restored 18th-century riverfront home, the center serves as an official visitor center for the area. Along with a boat launch, it features art and Susquehannock artifacts, and it connects to Native Lands County Park. 717-252-0229 Susquehannaheritage.org, info@susquehannaheritage.org.
- Columbia Crossing River Trails Center, 41 Walnut St., Columbia, PA: Along with a boat ramp, it offers maps, guides, exhibits, restrooms and a trailhead for the riverfront Northwest Lancaster County River Trail. Susquehannaheritage.org, info@columbiacrossing.org, 717-449-5607.
- Turkey Hill Nature Preserve, 2051 River Road, Conestoga, PA: A short, steep half-mile-plus hike to an overlook earns you a bird’s-eye view of the Conejohela Flats from one of the highest points along the Susquehanna.



A mushroom brightens a patch of leaf litter. (Dave Harp)

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Birds gather on overhead wires, their next move known only to themselves. (Dave Harp)

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Turn your backyard into a personal state park

By Adam Larson

The Harriet Tubman Underground Railroad State Park is surrounded by the forests and marshes of Blackwater National Wildlife Refuge, which protects the habitat that Tubman herself likely traveled through while leading enslaved people to freedom. While the park is best known for its exhibits about Tubman's life and legacy in its visitor center, there are also many eco-friendly features to preserve the surrounding habitat.

Whether your home is surrounded by forest, marsh or other homes, many of the natural design features at the park can be incorporated on your property, not only for your own benefit but also for that of the neighborhood and its ecological well-being.

Birdhouses

Scattered throughout the park's Legacy Garden are birdhouses, which provide nesting habitat for birds, as well as birdwatching opportunities for people. These houses can be purchased from retailers or built from a kit or scratch.

Individual species prefer different kinds of houses. Learn about the birds near you to accommodate their needs. The Maryland Department of Natural Resources website has instructions for building birdhouses for many species. To find it, search for "Maryland's Wild Acres" in your web browser.

Beehives

Three beehives are tucked away in a corner of the park. Bees are needed to pollinate many flowering species. Without bees, many plants can't produce seeds.

Bees are naturally attracted to flowers, which contain the pollen and nectar they eat, but other factors also influence them to frequent your flowers. Bee boxes can be easily built using simple tools and instructions on the Wild Acres page (select "Bees"), which also shows how to modify the boxes to attract specific bee species. It's also important to avoid using pesticides to control problematic insects because they also kill beneficial species like bees. Identify what's "bugging" you, then check the Beneficial Insects section of the Wild Acres page to find a treatment that won't inadvertently kill bees.



The grounds of the Harriet Tubman Underground Railroad State Park on Maryland's Eastern Shore are planted with native grasses, shrubs and wildflowers. (Beth Mahoney, CC BY-NC-ND 2.0)

Native plants

All of the planted greenery in Maryland's state parks is native to the area. Native plants maintain ecosystems, while some nonnative plants are not only invasive but can disrupt ecosystems and overrun a garden or backyard. Before buying a plant, make sure it will not be a problem down the road. A list of common invasive species is included on the Wild Acres page under the "Bad Plants, Planted by Good People" section.

Vegetated roof

Growing above your head as you explore the visitor center is a vegetated roof, which is frequented by butterflies and a family of killdeer. Vegetated roofs provide habitat for wildlife, insulate buildings and absorb heat, saving energy costs and shrinking urban "heat islands" in the process. Installing a vegetated roof is a complex and expensive process, best handled by a company that specializes in it, but there are other do-it-yourself alternatives to consider — container plants on a porch, patio or balcony.

Permeable surfaces

The park's Legacy Garden trail and parking lots are made of densely packed gravel instead of asphalt. Hard surfaces that water can't seep into increase runoff, which drags pollutants into our waterways and increases erosion. Permeable surfaces like gravel reduce runoff and protect vulnerable

shorelines and other geographic features. When adding a trail in your backyard, opt for permeable over paved.

Rain barrels

Rain barrels connected to the park building's downspouts collect and store rain. This not only reduces runoff from permeable surfaces but cuts down on municipal water usage when they are used to water plants long after the rain has passed. Purchase a rain barrel or make one using the Wild Acres website's directions under "Greening Your Landscape." Some jurisdictions even offer financial incentives for installing rain barrels, so it might pay to check with local municipalities before installing.

Solar photovoltaic lights

The parking lot uses solar-powered lights that convert and store energy from the sun to run the lights at night. Federal and state incentives are available to help homeowners install solar panels, and the Maryland Energy Administration has advice on solar panels on their website under the "Residential" tab on the main page.

Whether planting native flowers, building a birdhouse with children or grandchildren, or installing solar panels on your roof — all great options — you'll be improving your property and helping the environment. ■

Adam Larson is a seasonal ranger with the Maryland Park Service.

LETTERS TO THE EDITOR

Will counties step up to challenges of Bay restoration?

As a longtime boater and Bay health advocate I hesitate to throw a pail of cold (even tepid brackish) water on the idea of states ceding Bay health to the counties, as reported in the September issue, *PA hands over lead for Bay cleanup plans to counties*, but economic reality intrudes.

Counties' first objective is to make their budget without raising general taxes, so revenue from industries, agricultural producers and developers is vital. Counties will always favor revenue over expense, as most will view Bay cleanup measures despite long-range forecasts of economic benefits. County boards are seldom long-range people. I fear that the Bay's needs will finish a distant second place behind the counties' revenue needs. This is the real-life example of the "commons" supported by the many for the benefit of all. That's why we have National Parks, not because the local governments of those areas decided to set aside land to be enjoyed mostly by nonresidents of their jurisdictions. States are equipped to make improvements to benefit all of their counties, just as the federal government makes (or talks about) improvements to benefit all the states.

I'll be interested to learn the results of Pennsylvania's approach. I hope the *Bay Journal* remains assertive in learning its results.

*David Kirby
Montross, VA*

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The *Bay Journal* welcomes comments and perspectives on environmental issues in the Chesapeake 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 provided 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 editor Lara Lutz at 410-798-9925 or llutz@bayjournal.com. You can also reach the *Bay Journal* by mail at P.O. Box 300, Mayo, MD, 21106. Please include your phone number or email address.

As we face rising seas, let's choose nature over higher flood walls

By Doug Meyers

How we adapt our built infrastructure to the challenge of sea level rise is at the forefront of climate change discussions, especially in the Chesapeake Bay region. A recent *Bay Journal* article, though, *Can makeover save Annapolis City Dock from sea level rise?*, left out several major ways to avoid the mistakes of the past. To do so, we must consider remaking flood-prone areas in the Bay region with natural solutions that will mitigate climate change and benefit the environment.

The article focused on one plan that calls for raising the walkways around the dock, building a new flood wall and installing some sort of transparent or retractable sea wall. Pumps would also be needed to remove runoff trapped behind the new sea wall. The total cost? At least \$50 million.

The article notes that the money could come from the state or by raising taxes. But no one is quite sure how Annapolis or Anne Arundel County would pay for such an expense. It also didn't explore whether the bulk of the taxpaying public, who doesn't live in flood-prone areas, would support using these funds to preserve the current look of the waterfront.

The primary theme throughout the piece was preservation: preserving the look of City Dock, its waterfront buildings and walkways, and its parking capacity.

In many cases, including downtown Annapolis, preservation in place may be impossible or, at the very least, only a temporary solution. Our coastal landscape



Children play in nuisance flooding along the streets in front of the Chrysler Museum of Art in Norfolk, VA, after a heavy rainfall on July 29, 2017. (Photo by Skyler Ballard/Chesapeake Bay Program)

is going to look drastically different. The choice is either to work with nature or to react after it works us over. Reacting will be far more expensive and likely futile.

Climate change is causing sea levels to rise. Even in the best-case scenario, in which we drastically reduce greenhouse gas emissions quickly, Annapolis sea levels are predicted to rise an average of 1.5 feet by 2050 and 3 feet by 2100, according to a 2018 study by the University of Maryland Center for Environmental Science. If emissions aren't reduced, and so far they have not been, sea levels could rise by nearly 8

feet in our region by the end of the century.

Stronger storms caused by warming ocean temperatures and changing weather patterns are an even greater threat. The remnants of Hurricane Isabel in 2003 produced a storm surge of 7.2 feet in Annapolis and 8.2 feet in Baltimore. The UMCES study noted that given ongoing sea level rise, if a category 2 hurricane today were to follow the path of Isabel it would result in a storm surge of nearly 11 feet in Baltimore. One could deduce that the surge in Annapolis from such a storm would easily overtop the proposed 8-foot-high sea wall, swamping downtown for days.

And for those who don't remember Isabel, the recent damage done by Hurricane Ida underscores the vulnerability of urban areas to extreme weather, especially in places like Annapolis, where high tides and heavy rainfall work together to cause urban flooding.

Just as dire, the UMCES scientists noted that further hardening the shorelines around the Bay — such as by building higher bulkheads or sea walls — “would have the effect of increasing storm surge height in Baltimore and elsewhere around Maryland's shores.” Displaced water must

go somewhere.

By building higher sea walls, we'd be creating worse situations in neighboring areas that are threatened by sea level rise but lack the resources to keep up in the shoreline-hardening arms race. And while high-value commercial areas may be able to be protected using vast sums of taxpayer money, it will be far more difficult and expensive to insulate the surrounding roads, pipes and utilities needed to keep those areas vibrant.

We must begin to come to terms with the reality that we can't save the coastline as it currently exists. We need to prioritize natural adaptation, but planned abandonment should be considered as well.

Rather than build ever higher walls and rip rap monuments, we should be developing strategies for moving the human footprint away from the shore — while also looking for ways to restore wetlands, add trees along shorelines, diversify urban landscapes and encourage the growth of wave-attenuating marsh grasses. These natural systems absorb the energy of storms while also reducing storm surges and runoff. The improvements also benefit water quality, increase habitat for animals and beautify communities.

A re-imagined City Dock with marshes extending around it, more trees, green infrastructure on buildings, and natural shorelines would serve as a model for coastal communities around the world on how to responsibly adapt a historic town to climate change.

Maryland has a vehicle to get this work done — the 2020 state law shepherded by State Sen. Sarah Elfreth that enables cities and counties to establish finance authorities that can issue bonds for climate resilience projects. The question is whether there will be the political will and public support to alter our landscape in a way that may seem radical compared to pumps and higher flood walls, but will protect our sensitive coastal areas, and us, in the long term. ■

Doug Meyers is the Maryland senior scientist for the Chesapeake Bay Foundation.



Cars slog through floodwaters on Annapolis's Compromise Street near City Dock in 2020. (Dave Harp)

Trees minus ground cover: recognizing the shady side of shade

By Scott Hall

Several years ago when walking back to my car after a short visit to a park, I noticed that the steep, roughly 70-foot-high hillside bordering the east side of the parking lot was bare dirt except for a dozen or so assorted trees that had managed to secure a foothold on the slope some decades ago.

Additionally, there were tall trees on the hills and banks of the west side and most of the south side of the small parking area. Only the flat ground on the north side and a small section of the hilly south side were free of shade-producing trees — and, not coincidentally, were covered with grasses of one kind or another. The shade trees on the steep hill and elsewhere, as well as a less-than-ideal orientation to the sun, prevented soil-saving ground covers from taking root. And in the dense shade directly under the trees it was nearly impossible.

Furthermore, steep slopes tend not to hold leaf litter in place; wind, rainfall and gravity easily send leaves to the hill bottom and then, during sufficiently hard rains, to the nearest storm drain.

When we see signs of soil erosion far away from a stream or river, most of us don't intuitively recognize it as a source of sediment that will eventually find its way to the Bay, where it clouds the water and deprives underwater grasses of the sunlight they need to thrive and provide dissolved oxygen for other marine life. But, on that particular day at that particular spot, making the connection between the erosion and the Bay's plight was easy — because at the north end of the eroded hill was a storm drain, and the Chesapeake Bay was no more than 200 yards away.

One would think that, of all the adults who lived in the area and visited the park, and of all the adults who own or once owned the homes perched atop those steep hills over the decades, someone would have recognized the soil erosion problem and fixed it because the fix was so simple: Minimize shade and plant ground cover. Securing local approval for disturbing those trees within the buffer of a critical area of the Bay would be easy after bringing officials



A somewhat robust tree grows on the stream bank in the left photo, but the soil beneath it is exposed and prone to erosion. In the right photo, soil on the slope is held in place by a thick mat of grass. (Scott Hall)

to the site to see the erosion firsthand.

That no such action had been taken for decades makes it clear to me that we have to do more to educate the public and, in particular, property owners who are losing land (and land value) to erosion but still failing to make the connection.

Driving the point home for me that day was another steep slope, just a short walk from the parking lot. This one was treeless and had a wide-open exposure from northeast to northwest. Not surprisingly, it was thickly covered with tall grasses and other ground cover plants.

Here were two similarly steep slopes, just a stone's throw from each other, yet amazingly dissimilar in terms of protecting the soil from erosion. The operative difference was simple: shade trees on one, no shade trees on the other. The resulting difference was soil-protecting lush growth, compared with soil exposed to rainfall runoff with sediment ultimately flowing into the Chesapeake Bay.

I realize, of course, that we should think long and hard about removing trees from any natural setting, but we must also recognize that trees alone don't control erosion in every circumstance — steep slopes being the obvious example. This is especially problematic if the trees in question create deep shade and there is no shade-tolerant ground cover to hold the soil in place.

One can find perfectly demonstrative examples of this problem everywhere, sometimes virtually side by side. Not long after I saw the eroding parking lot slope, I came across a streambank that showed the difference at a single glance (see photos at top): severe erosion under heavily and low-branched shade trees, and right next to it a dormant but robust growth of tall grass clearly holding the bank in place.

The difference couldn't have been more obvious or more easily corrected. On the eroding bank, either reduce the shade by pruning or replace the tree with a more suitable one, or plant groundcover that

flourishes year-round in shady and root-embedded soil.

The plight of the Bay and its seemingly insurmountable issues are not the result of immovable forces, nor the result of inexplicable phenomena. Each issue has solutions. We know what those solutions are, and we have to recognize and acknowledge that Bay pollution doesn't come only from law-breaking industrial operations or farming or municipal wastewater practices. It comes from all of us, not deliberately, but often because we fail to grasp the obvious.

Taking that time to recognize, to acknowledge, to identify and to appreciate will pay dividends. The Bay and its valuable resources will rebound if we give it a chance. But we have to correct the mistakes that have been made and, because many of those corrections are readily within our reach, the task is not that arduous. ■

Scott Hall is a lifelong resident of and advocate for the Chesapeake Bay watershed.

The Twilight Estuary: An oldie-but-goodie Chesapeake film



By Tom Horton

The Chesapeake Bay has long inspired notable films, dating at least to 1965, when avid sailor and CBS news icon Walter Cronkite produced *The Sailing Oystermen* aboard the skipjack *Ruby Ford* with legendary Smith Island Capt. Daniel Harrison and his brother Edward.

David Harp, Sandy Cannon Brown and I have made a few films ourselves for the *Bay Journal*, dealing with more current topics like sea level rise and beavers' potential to help restore water quality.

But if I had to suggest only one film to watch, it might be Michael Fincham's little gem, *The Twilight Estuary*, which debuted in 1985. It's an environmental mystery tale, a scientific detective saga, a gripping story finely told, that stands the test of time. I showed it to seventh graders in the 1980s when I taught at Smith Island for the Chesapeake Bay Foundation. I show it now to most of my college classes at Salisbury University.

Fincham, a prolific science writer, documentary producer and Emmy-winning videographer, scavenged funds from sports videos he did for teams at the University of Maryland and produced *The Twilight Estuary* for the university's Sea Grant College.

The Chesapeake's seagrasses were dying, from Havre de Grace to Norfolk, up rivers and down. Meadows of underwater vegetation, which nurture crabs and fish, provide oxygen and sequester carbon, had decreased from an estimated half a million acres to around 40,000 by the mid-1980s.

No one knew why. But losing an immense, productive ecosystem that had persisted throughout the Chesapeake for thousands of years signaled something ominous.



The Twilight Estuary, a film released in 1985, documents scientists' efforts to explain the decline of the Chesapeake Bay's vital underwater grasses. (Dave Harp)

The film begins in beauty: Deep summer, Smith Island, sun rising on graceful crabbing boats that underpin a whole culture, harvesting soft crabs in the grassy shallows where they go to shed their shells.

"We got a gold mine down here," waterman Denny Bradshaw says to the camera, adding, "long as everybody takes care of everything," which clearly was not the case.

Was the culprit the thousands of factories and power plants that discharged their wastes into the Bay? The scientists quickly rule out these obvious suspects; they have their issues but aren't causing such widespread decline.

Next up is the "killer" that the scientists are betting on: farm chemicals. Indeed, Fincham said he spent so much of his time and budget on the topic that he had to scramble to film what turned out to be the real answer.

But at the moment, many were convinced it was herbicides, which farmers across the Bay region had been doubling and tripling their use of during the 1970s and '80s. More weedkillers on the land, running off into the water, coincided seamlessly with the "weeds" (aquatic grasses) dying in the Bay.

I wrote an article that led the *Baltimore Sun's* front page on Aug. 8, 1977, about research indicating herbicides were possibly the problem.

The agriculture industry and its supporters in the University of Maryland's farm

research college were so rattled that they worked to obstruct and deny the research. The interference got bad enough that some of the seagrass scientists said privately that they "really hoped" the gathering evidence would indict big agriculture.

But it didn't — not the way everyone expected.

Painstaking measurements that looked for farm chemicals running off in high enough concentrations to kill seagrasses found that yes, locally, like in a farm drainage ditch after a rainstorm, the stuff was killing off some underwater grasses. But in creeks, seldom. In larger rivers, never. In the Bay's mainstem, not even close. It added stress maybe, but no smoking gun.

What remained was sunlight, which all green plants need to grow. In Virginia young scientists Bob Orth and Dick Wetzel, and in Maryland young scientists Walter Boynton, Michael Kemp and Court Stevenson began developing a new storyline — that the once-clear Chesapeake had become murkier, a twilight estuary.

All of those researchers would make distinguished careers on the Chesapeake and beyond. Their new culprit for what was killing the grasses turned out to be all of us, or at least most everything humans did across a huge watershed some 16 times as large as the Bay itself.

The problem, they learned, is nutrients: nitrogen and phosphorus from sewage, from farm fertilizers and manure, from developments and from air pollution (though the air's importance was not understood until later). Also sediment, running from fields and housing developments and clear-cut forests, measurable in tons per acre.

It was all clouding the water, cutting the light that the grasses needed for growth. The coup de grace came from something that cut light even further. And though it was right in front of their eyes, for a while the scientists didn't see it.

It was "epiphytic growth," essentially slime, fueled by excess nutrients, that was coating the leaves of the seagrasses. Fincham recalled: "We were all sitting in a room screening footage that showed extreme epiphytic fouling [and] not one of us remarked on it or wondered what effect that might have on the grass demise."

The young scientists, smart as they were, had little experience with the healthy, clean-leaved grasses that had existed decades and centuries before. The fouling looked normal. A lowly grad student, Ken Staver, finally drew attention to it.

The scientists featured in *The Twilight Estuary* did their jobs well. Society has done its job of controlling nutrients and sediment less well. The Bay grasses have rebounded to about 70,000 to 108,000 acres, varying year to year, but further progress seems stalled.

Other factors like climate change, scarcely an issue in the 1980s, are complicating the situation now. I'm talking with Fincham and others about an update film on the grasses.

But *The Twilight Estuary* remains a classic primer on how the Chesapeake ecosystem works and on the importance of science — science pursued Baywide — for restoring this estuary.

Maryland Sea Grant has made *The Twilight Estuary* available free via YouTube through the end of 2021. To view the 40-minute film, go to bit.ly/the-twilight-estuary. ■

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.



BULLETIN BOARD

VOLUNTEER OPPORTUNITIES

WATERSHEDWIDE

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 and 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 will be used to design conservation measures to save these insects from extinction. Info: friendoftheearth.org.

Citizen Science: Creek Critters

Use Audubon Naturalist's *Creek Critters* app to check a stream's health by identifying small organisms, creating a report based on what you find. Get the free program at App Store or Google Play. Info: anshome.org/creek-critters. Learn about partnerships/host a *Creek Critters* event: cleanstreams@anshome.org.

PENNSYLVANIA

Project FeederWatch

Participate in *Project FeederWatch* 9 a.m.-4 p.m. Nov. 16, 17, 23, 24, 30 & Dec. 1, 7, 8, 14, 15, 21, 28, 29 at Nixon Park in Jacobus. In this citizen science program, participants count the number and identify species of birds visiting the park's feeders from November through early April. The data is forwarded to the Cornell Laboratory of Ornithology and becomes part of a nationwide data set that tracks winter



WORKDAY WISDOM

Make sure that when you participate in cleanup or invasive plant removal workdays to protect the Chesapeake Bay watershed and its resources that you also protect yourself. Organizers of almost every workday strongly urge their volunteers to wear long pants, long-sleeved shirts, socks and closed-toe shoes (hiking or waterproof). This helps to minimize skin exposure to poison ivy and ticks, which might be found at the site. Light-colored clothing also makes it easier to spot ticks. Hats are strongly recommended. Although some events provide work gloves, not all do; ask when registering. Events near water require closed-toe shoes and clothing that can get wet or muddy. Always bring water. Sunscreen and an insect repellent designed to repel both deer ticks and mosquitoes help. Lastly, most organizers ask that volunteers register ahead of time. Knowing how many people are going to show up ensures that they will have enough tools and supervisors. They can also give directions to the site or offer any suggestions for apparel or gear not mentioned here.

bird population trends. Beginners welcome. ADA accessible. Volunteers are asked to commit to one hour every other week. Info: Nancy at 717-840-7226.

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 to develop new initiatives. Info: middlesusquehannariverkeeper.org.

■ *Water Reporter App*: Track the health of Middle Susquehanna watershed's fish species by sharing photos, info about catches via an app. Reports, interactive map available at middlesusquehannariverkeeper.org.

VIRGINIA

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@pwsxcd.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 and internships for high school & college students. Info: Holly Geary at 540-687-3073, info@goosecreek.org, goosecreek.org/volunteer.

Citizen Science: Ghosts of the coast

The Gedan Lab at George Washington University and the Virginia Coast Reserve Long-Term Ecological Research project are asking the public to help document the formation of ghost forests (dead forests created by rising sea levels). See a ghost forest? Contribute to a collaborative map by submitting observations to storymaps.arcgis.com/stories.

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.

Become a water quality monitor

Train online with the Izaak Walton League to volunteer or 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." Activities include:

■ *Snap a Stream Selfie*: Collect trash data, take a photo at a local stream.

■ *Become a Salt Watcher*: Use an easy test kit to check for excessive road salt in a stream.

■ *Check the Chemistry*: Spend 30 minutes at a waterway with a handful of materials, downloadable instruction sheet.

■ *Survey Stream Critters*: Use pictures in an app to identify stream inhabitants. The number, variety of

creatures reveal how clean the water is.

■ *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.

VA Master Naturalists

VA Master Naturalists is a corps of volunteers who help to manage, protect natural areas through plant & animal surveys; monitor streams; rehabilitate trails; teach in nature centers. Training covers ecology, geology, soils, native flora & fauna, habitat management. Info: virginiamasternaturalist.org.

Chemical water monitoring teams

Help the Prince William Soil and Water Conservation District and Department of Environmental Quality by joining a chemical water quality monitoring team. Participants collect data from local streams. Training provided. Monitoring sites are accessible. Info: waterquality@pwsxcd.org, pwsxcd.org.

MARYLAND

Frederick County stream buffers

Help Stream-Link Education plant 30 acres of forest buffers along Frederick County streams. Volunteers, ages 10+, are needed 9-11 a.m. Oct. 9 & 23 and Nov. 6 in Emmitsburg; Nov. 20 and Dec. 4 in Thurmont. Info: streamlinkeducation.org/volunteer.

Anita C. Leight Estuary Center

Remove invasive plants and install native species 2-4 p.m. Oct. 17 at the Anita C. Leight Estuary Center in Abingdon. Volunteers, ages 14+, will be taught how to identify problem plants, removal & restoration strategies. Wear sturdy shoes, long sleeves, work gloves for field work, weather permitting. Preregistration required. Info: 410-612-1688, 410-879-2000 x1688, otterpointcreek.org.

Delmarva Woodland Stewards

The U.S. Department of Agriculture's Forest Service and Maryland Forest Service are creating a training and outreach program, the *Delmarva Woodland Stewards*. Funding from the federal Landscape Scale Restoration Grant program will be used by the partnership to demonstrate, educate, provide outreach that will enhance forest and wildlife management practices, promote the ecological benefits of prescribed fire, pursue tree planting opportunities for water quality, and highlight the need for low grade/biomass markets in forest health, restoration, sustainability. The program provides direct training, outreach to landowners, volunteers who want to learn more about how to implement forest, wildlife management practices. Info: Matthew Hurd at matthew.hurd@maryland.gov.

Garden Glow pumpkin carving

Help to carve hundreds of pumpkins Oct. 19 & 20 for the Ladew Topiary Garden's Garden Glow. Pumpkins, patterns, tools provided although participants, ages 14+, are invited to bring their own ideas, tools. The schedule for each day is: 9-11 a.m. cut and gut; 9:30 a.m.-12 p.m.: carve; 1-4 p.m. carve. Registration/info: Sheryl Pedrick at spedrick@ladewgardens.com, 410-557-9570 x226.



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.

November issue: October 11
December issue: November 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.



BULLETIN BOARD

Annapolis Maritime Museum

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

St. Mary's County museums

Become a member of 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 and Piney Point Lighthouse Museum & Historic Park. Work varies at each museum. Info: At St. Clement's Island Museum 301-769-2222. At Piney Point Lighthouse Museum & Historic Park 301-994-1471.

■ **Students:** (11 & older) Work in the museum's collections management area on artifacts that have been excavated in the county. Info: 301-769-2222.

Report a fish kill

If you see a fish kill, call the Maryland Department of Environment's *Fish Kill Investigation Section*. Normal work hours: 443-224-2731, 800-285-8195. Evenings, weekends, holidays: Call the Chesapeake Bay Safety & Environmental Hotline at 877-224-7229.

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.

Severn River Association

The Severn River Association is looking for people to tell the Severn's story. Writers, photographers, reporters, memoirists, editors are needed to document the river's wildlife, people,

forests, history, culture, sailing. SRA can create internships for journalists of all ages who want to tell a story, cover meetings, take pictures. Info: info@severnriver.org. Put "volunteer" in the message box.

Ruth Swann Park

Help the Maryland Native Plant Society, Sierra Club and Chapman Forest Foundation remove invasive plants 10 a.m.–4 p.m. the second Saturday in October, November and December 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 a.m.; return at 5 p.m. Carpool contact: 301-277-7111.

Chesapeake Bay Environmental Center

Help the Chesapeake Bay Environmental Center in Grasonville. Drop in a few times a month or more frequently. 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; participate in CBEC's teams of wood duck box monitors, other wildlife initiatives. Other opportunities include fundraising, website development, writing for newsletters & events, developing photo archives; supporting office staff. Volunteers donating more than 100 hours of service per year receive a free one-year family membership to CBEC. Info: volunteercoordinator@bayrestoration.org.

Chesapeake Biological Laboratory

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

Citizen science: Angler survey

Use the *Volunteer Angler Survey* smartphone app to help the Department of Natural Resources collect species, location, size data. Information is used to develop management strategies. The artificial reef initiative, blue crab, freshwater fisheries, muskie, shad, striped bass programs also have mobile-friendly methods to record data. Win quarterly prizes. Info: dnr.maryland.gov/Fisheries/Pages/survey/index.aspx.

Patuxent Research Refuge

Volunteer in the Wildlife Images Bookstore & Nature Shop inside the National Wildlife Visitor Center, on the South Tract of the U.S. Fish and Wildlife Service's Patuxent Research Refuge in Laurel. Help for a few hours or all day 11 a.m.–4 p.m. Wednesday through Saturday. Open/close the shop, help customers, restock, run the register. A future webstore may need volunteers. Training provided. Info: wibookstore@friendsofpatuxent.org.

CONFERENCES/CLASSES WATERSHEDWIDE

Chesapeake Watershed Forum

The 16th annual Chesapeake Watershed Forum, *The Future is Now: Getting to (and Moving Beyond) 2025* takes place Nov. 3–5. Registration for the virtual forum includes online workshops, sessions, plenary speaker presentations, participation in virtual and in-person networking activities, in-person field trips and access to session recordings and content after the event. Info: contact Jenny McGarvey at jmcgarvey@allianceforthebay.org.

Beginner farmer training

Future Harvest/Chesapeake Alliance for Sustainable Agriculture is accepting applications for the 2022 *Beginner Farmer Training* program. The BFTP provides a free, year-long immersive training experience that combines a comprehensive classroom curriculum with hands-on learning at Chesapeake region farms that employ practices that are profitable, protect land and water and build healthy communities. Three levels of training are designed to meet the needs of new farmers at different stages, from entry-level to advanced. The program has built-in scheduling flexibility and is open to beginning farmers in Maryland, Virginia, Delaware, the District of Columbia, West Virginia and Pennsylvania. The deadline for applications is 11:59 p.m. Oct. 22. Info: futureharvestcasa.org.

VIRGINIA

Fall in the Piedmont virtual forum

Learn about the state's regions and seasonal changes at the 2021 Virginia Association for Environmental Education virtual mini-conference, *Fall in the Piedmont* 12 a.m.–11:59 p.m. Oct. 23. There is enough space to offer up to nine, 50-minute sessions. The conference includes professional development, learning, collaboration, and environmental education efforts and resources in Virginia, beyond. For pricing details, registration (required) packet, scholarship opportunities, visit vae.wildapricot.org. Click on "events" in the menu. Info: April Harper at events@virginiaee.org, 804-916-9302.

Science teachers institute

Registration is open for the Virginia Association of Science Teachers Institute's *Science, Systems, Solutions*, which includes onsite and virtual sessions. The virtual institute runs 4–9 p.m. Nov. 16–18; Add-on in-person sessions take place the afternoon and evening of Nov. 19 and all day Nov. 20 in Harrisonburg. The virtual event features concurrent session presentations, general session speakers, an exhibit hall, vendors, chat rooms and discussion boards in all subject areas for grades K–12. The In-Person Professional Development Institute Plus features: field trips

to a rock quarry, a pre-cast concrete planet, an extinct volcano and a taste of local viticultural products; lab experiences led by James Madison University professors; shows at the JMU planetarium & mineral museum; night on the town: Science, Systems & Solutions in the City scavenger hunt. Full registration to the Virtual PDI is required to purchase the add-on PDI Plus package. The online platform link will be provided closer to event. Registration depends on selected options. For info on becoming a presenter/ sponsor at either event or to register, visit vast.wildapricot.org/event-4277582.

PENNSYLVANIA

Land conference call for papers

The Pennsylvania Land Conservation Conference, which takes place March 16–18 in Gettysburg, has issued call for workshop proposals as well as nominations for the Local Government Conservation Leadership Award. Proposal info: WeConservePA.org/conference. Award info: WeConservePA.org/award. Registration, conference info: WeConservePA.org/events.

EVENTS / PROGRAMS

MARYLAND

Ladew Topiary Gardens

Events at Ladew Topiary Gardens in Monkton include:

■ **Virtual Lecture Series:** The fall series will be presented virtually through Zoom, as well recorded and made available for paid registrants. Fee: \$20. Info/registration: Sheryl Pedrick at spedrick@ladewgardens.com, 410-557-9570 x 226.

■ **Pressing Botanicals / Preserving the Wonder of Ladew:** 4 p.m. Oct. 14. Artist Anne Blackwell Thompson preserves foliage and flowers using centuries-old traditions and turns her bounty into beautiful, artistic compositions. She'll use her work to discuss the history of botanical art. Info: blackwellbotanicals.com.

■ **A New Garden Ethic:** 4 p.m. Nov. 4. Benjamin Vogt, owner of Monarch Gardens, a prairie-inspired design firm in Nebraska, will use more than 100 images to explore the rich complexity of rethinking "pretty" and show how to embrace gardens as places to create empowering social and cultural change. Vogt wrote *A New Garden Ethic: Cultivating Defiant Compassion for an Uncertain Future*, as well as the forthcoming *Prairie Up: An Introduction to Natural Garden Design* (2022).

■ **Garden Glow:** 5–9 p.m. Oct. 21–23. All ages. Hundreds of carved, lit pumpkins. Plus, illuminated sculptures & installations, live music, strolling performers, family-friendly educational activities for children, local food vendors, beer, wine & spirits. Fee: \$30/adults; \$23/seniors, students; \$10/children. Info: web search "Ladew topiary garden glow."



CHESAPEAKE CHALLENGE

ANSWERS TO
Quiz for the eel smart!
on page 45

1. Greenland to Venezuela
2. Estuaries
3. Sargasso Sea
4. True
5. Eggs, *leptocephalus* (larva), glass eels, eelers, yellow eels, silver eels
6. Rusty crayfish



BULLETIN BOARD

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Game bird stamp contest

Residents and nonresident artists have until Nov. 5 to submit their original works for the annual *Maryland Migratory Game Bird Stamp Contest*. The winning entry will appear on the 2022-23 Migratory Game Bird Stamp, which is required to hunt these birds in Maryland. Each contestant may submit up to three entries. Fee: \$15 one entry; \$20/2; \$30/3. Proceeds help fund game bird, waterfowl projects. The state Department of Natural Resources judges entries at 2 p.m. Nov. 13 during the annual Waterfowl Festival in Easton. (Attendance at the event is subject to COVID-19 safety precautions.) Complete contest rules, entry forms: web search "2022-2023 MD migratory game bird stamp." Info: christopher.markin@maryland.gov.

Anita Leight Estuary Center

Take part in any of these upcoming programs at the Anita C. Leight Estuary Center in Abingdon, MD. Except where noted, ages 12 & younger must be accompanied by an adult for all programs. Events meet at the center and require registration. Payment is due at time of registration. Info: 410-612-1688, 410-879-2000 x1688, otterpointcreek.org. Programs include:

- *Halloween Hike & Campfire*: 6-9:30 p.m. Preregister for half-hour time slots to begin hike. Allow 1 hour for hike and campfire. Oct. 23. Meet "scary" Halloween creatures up close, listen to their tales. Later, roast marshmallows by a campfire. Participants must be able to handle a slightly spooky 0.75-mile hike in the woods at night. Register in advance - pay \$7 fee at door.
- *Signs of Fall*: 3-4 p.m. Oct. 10. All ages. Short hike searches for signs of the season. Fee: \$10/family.
- *Fall Foragers*: 10:30 a.m.-12 p.m. Oct. 16. Ages 12+ Look for, sample forest's harvest. Fee: \$10/family.
- *Critter Dinner Time*: 1:30 p.m. Oct. 16. All ages. Learn about turtles, fish, snakes while they eat. Free.
- *Nature Discovery Tots*: 1 p.m. Oct. 17. Ages 6 & younger. Naturalist-led exploration of Nature Discovery Area. Free.
- *Fall Foliage Water Strider Pontoon*: 9-10:30 a.m. Oct. 22. Meet at Flying Point Park. Ages 2+ Binoculars provided, cameras encouraged. Fee: \$10.
- *Fall Colors Canoe*: 10 a.m.-12:30 p.m. Oct. 23. Ages 8+ Paddle around the marsh, learn how deciduous trees prepare for cold weather. Fee: \$12.
- *Punkin' Chunkin' Hike*: 1-2:30 p.m. Oct. 24. All ages. Hike the Discovery Trail to see what creatures have turned up in jack-o-lanterns left from Halloween Hike. Pumpkin chunkin' begins later. Treats, free pumpkin. Fee: \$10/family.
- *Halloween Eve - The Living Dead*: 10-11:30 a.m. Oct. 30. Ages 6+ Learn about an ecosystem that

depends on the dead during a trail exploration. Halloween-themed treat. Fee: \$10/family.

- *Spooky Sunset Halloween Kayak*: 4-6:30 p.m. Oct. 30. Ages 13+ Note: ages 17 & younger w/ adult. Paddle Otter Point Creek. Costumes encouraged. Fee: \$15.
- *Halloween Scavenger Hunt*: 12:30-4:30 p.m. (Register for 1-hour time slot.) Oct. 31. Ages 2+ Costumed participants search for hidden clues. Complete word puzzle for prize. Fee: \$12/family.

Chesapeake Bay Maritime Museum

Programs offered by the Chesapeake Bay Maritime Museum in St. Michaels, MD:

- *Maryland Dove Tours*: 3 p.m. Oct. 14, 21 & 28. 45-minute tour goes behind the shipyard for immersive view of *Maryland Dove's* construction. All guests must wear closed-toed, supportive shoes. Fee: \$15. Info/registration: cbmm.org/shipyardprograms.
- *18th National Exhibition of the American Society of Marine Artists*: Oct. 22 through Feb. 22. The juried biennial exhibition includes paintings, drawings, sculptures, scrimshaw, hand-pulled prints submitted by prominent contemporary marine artists. Entry included w/general admission. Info: cbmm.org, 410-745-2916.
- *Maryland Dove - A Symposium on Memory & Meaning Series*: Talks cover transition from current vessel built in the 1970s to a modern reproduction based on decades of research. Fee: \$7.50/session. (Sessions will be recorded, shared with registrants who are unable to participate live.) Info, to register, visit cbmm.org/dovesymposium.
- *Diving into the Past - How Underwater Archeology Informed Maryland Dove*: 3 p.m. Oct. 20. With the original *Dove* presumed lost at sea, its reproduction's design drew heavily on research into the preserved shipwrecks of other period vessels. The head of research at Sweden's Vasa Museum, speaker Fred Hocker played a critical role in translating discoveries from the field of maritime archeology to guide the project.
- *Building Maryland Dove*: 3 p.m. Oct. 27. CBMM's Lead shipwright Joe Connor highlights milestones and reviews important design and build choices to craft a vessel that blends historical authenticity with modern U.S. Coast Guard standards for passenger-carrying vessels.

MD Park Quest 2021

The Department of Natural Resources' Maryland Park Quest 2021 for families runs through Oct. 31. More than 25 state parks are offering outdoor activities that feature the state's cultural, historical, natural resources on public lands, parks. This year's theme, *Spread Your Wings to Explore Maryland's State Parks*, highlights the state's birds. Adjustments related to the COVID-19 pandemic include:

- Ranger-led activities have been turned into do-it-yourself programs. Web search "MD park

service" to download, print worksheets.

- Passport or registration is no longer required. Participants/teams completing at least 12 activities before Oct. 31 and the Quest form by Nov. 1 are eligible to win prizes (proof of completion via photos required). Drawings take place Nov. 2. Winners will be notified by email. Prizes range from stickers and bandanas to an Annual State Park & Trail Passport. Participants will need to pay day-use service charges at certain parks. (A list of service charges is found at: dnr.maryland.gov/Publiclands/Pages) There are no additional fees to participate; all materials are available online. Downloading a copy of the *Maryland Bird List* at mdbirds.org/wp-content/uploads/md-bird-list.pdf or *Checklist to Maryland Birds* at mdbirds.org/wp-content/uploads/MOS-MD-Field-Checklist-Oct-2019.pdf will help with many of the quests. Bring binoculars, if possible, to see more birds. Info: Ranger Melissa Boyle Acuti (Monday-Friday) at melissa.boyle@maryland.gov.

PENNSYLVANIA

York County parks

- Attend an event at one of York County's Parks. Except where noted, registration is required: 717-428-1961, NixonCountyPark@YorkCountyPA.gov. Include name, number of participants, children's ages, phone number. Info: YorkCountyParks.org. The schedule is:
- *Five Senses Nature Walk*: 10-11a.m. Oct. 16-17. Nixon Park, Jacobus. For young children. Woods, pond adventure explores sights, sounds, sensations.
 - *Guided Nature Walk*: 2-3:30 p.m. Oct. 10 & 31. Nixon Park, Jacobus.
 - *Fall Costume Trail*: 4-7 p.m. Oct. 22. Pines Picnic Area of Rudy Park, East Manchester Township: Wear a costume, stop at stations to learn about nocturnal animals. (Trail takes about 1 hour).
 - *History & Mystery of Raab Park*: 10 a.m.-12 p.m. Oct. 23. Meet at Hoff Road parking lot, Seven Valleys. Learn about how ore was removed from mine in the past, bats conservation efforts in the mine shafts today during 2-mile hike on rough terrain. Wear proper hiking attire.
 - *Hawkwatch Drop-in*: 10 a.m.-2 p.m. through Oct. 31. North Overlook of Oak Timbers Parking Lot, Rocky Ridge Park, York. Practice identifying raptors alongside naturalists, citizen scientists. Bring binoculars, field guides, lawn chairs. No registration.

RESOURCES

WATERSHEDWIDE

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.

MARYLAND

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, 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.

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.

Million Acre Challenge

Future Harvest's *Million Acre Challenge* is working to advance healthy soil on 1 million acres of Maryland farm land. 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.

CHESAPEAKE CHALLENGE

— Kathleen A. Gaskell



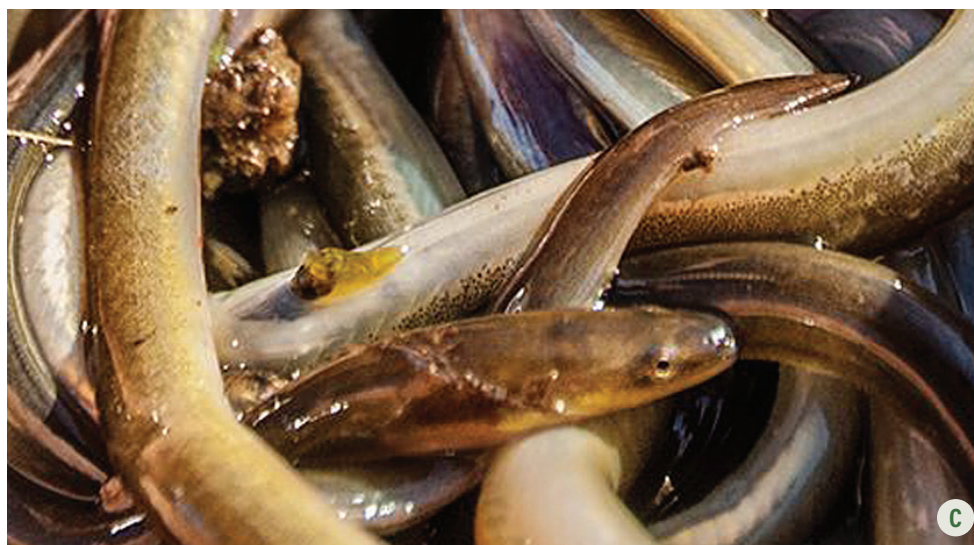
These facts are eely true

- **Shocking!** Not all fish with “eel” in their names are true eels. There are more than 800 species of true eels (order *Anguilliformes*). The electric eel (order *Gymnotiformes*) is more closely related to catfish than eels.
- **Holy mackerel!** Or should we say holy eels? When Leonardo da Vinci’s Last Supper was cleaned in 1997, its restorers discovered that the meal on the table was grilled eel and orange slices, one of the artist’s favorite dinners.
- **Never eat raw eel, unless you want your goose cooked:** Eel blood contains a deadly toxin. Cooking and digestion neutralizes the toxin.
- **Breathing, not biting:** When an eel opens and closes its toothy mouth, it’s breathing, not showing aggression.
- **Change in appetites:** A young eel has no reproductive organs. Once it develops into an adult eel ready to mate, it stops eating.
- **Limber locomotion:** Eels are among the best when it comes to swimming backward. They swim with their entire body, creating waves that move it forward or backward.
- **Super slime!** “Slippery as an eel” refers to the mucus that surrounds the fish. This protective covering suffocates parasites and pathogens and helps prevent scratches from reefs or rocks. It also makes eels more aerodynamic by filling in the spaces between its scales. Lastly, the thickness of the slime determines how much water the fish takes in: thinner lets in more water, thicker lets in less. Some scientists believe this aids the eel when it moves between salt- and freshwater.

Quiz for the eel smart

Can American eels move on land? Yes, for short distances if the ground is wet enough from rain or dew. You will have to figure out the answers to the rest of the questions on your own. Answers are on page 43.

1. Where along the Atlantic Coast are American eels found?
A. Greenland to Venezuela
B. Greenland to Florida
C. Maine to Florida
D. Maine to Venezuela
2. American Eels live in freshwater streams and estuaries. In which habitat do they grow the quickest?
3. Where do American eels spawn and their eggs hatch?
A. Atlantic Gyre
B. Bermuda Triangle
C. Gulf Stream
D. Sargasso Sea
4. True or false? Scientists have never seen an American eel spawn.
5. Put these stages of the American eel’s life in chronological order: eggs, elvers, glass eels, leptocephalus, silver eels, yellow eels.



6. Biologists hope that American eels might help reduce the presence of an invasive shellfish that eels feed on. Which species might they help control?
A. New Zealand mud snail
B. Rusty crayfish
C. Veined rapa whelk
D. Zebra mussels

A. An American eel can grow up to 4 feet in length and weigh 17 pounds. (Dave Harp)

B. In the Latin name (*Anguilla rostrata*) for the American eel, *Anguilla* means eel; *rostrata* translates into either “long,” “curved” or “beaked” nose. (Dave Harp)

C. These eels were collected during a survey in Buffalo Creek in central Pennsylvania. (Dave Harp).

The biophilia hypothesis: Do we have an innate love of nature?



STEWARD'S CORNER

By Carly Starobin

Have you ever wondered why so many people have responded to the COVID-19 pandemic by turning to the great outdoors — hiking, biking, gardening, fishing, etc.? To be sure, it's partly a matter of common sense: Being out in the open air, away from other people, is safer during a pandemic. But could it also be a matter of innate human behavior? Could it be that we are *instinctively* drawn to nature, or are at least somehow instinctively more at ease when surrounded by it?

I think so, and I think that fits neatly into what is known as the “biophilia hypothesis.” To start at the beginning, the word biophilia was coined in the 1960s by German social psychologist Erich Fromm to describe “the passionate love of life and all that is alive.” A decade or so later, renowned American biologist E. O. Wilson borrowed the word for his proposition — which ultimately led to a book, *The Biophilia Hypothesis*, by Wilson and a team of like-minded scientists — that our love of nature is not merely a state of mind experienced by some or many humans. Rather, it is a product of human evolution, engrained in us by natural selection. It's the source of our “innately emotional affiliation” to other living things, and it is why we subconsciously seek connections to other forms of life.

Although the hypothesis is not, and perhaps never can be, scientifically proven, it resonates for me — and there is evidence to support the idea that being in nature makes us happier and healthier. If we can understand why that is, we can begin to see why humans may be subconsciously seeking it out for our own health and happiness.

In terms of physical health, we know that breathing in clean outdoor air is good for our lungs. We know the sun provides vitamin D, an essential vitamin that aids in bodily functions like nutrient absorption.



The Papadakis Integrated Science Building at Drexel University in Philadelphia features a “living wall.” (Terry Robinson, CC BY-SA 2.0)

Additionally, there have been studies showing that simply being in nature and seeing it around us can reduce our heart rate and blood pressure.

Connecting with the natural world may also improve our mental health. A number of studies have shown that humans experience reduced levels of cortisol (the so-called stress hormone) when they are in green spaces. Other natural cues, like the sound of running water or ideal temperatures, have been shown to improve attentiveness, concentration and overall happiness and comfort.

Once we notice the different ways

nature can benefit us without our even knowing, it's easier to understand why the subconscious may be drawn to it. If feeling connected to nature can reduce stress and increase happiness, how can we expand on that to benefit our everyday lives? It reminds me of a professor at the University of Virginia, Tim Beatley, who introduced me to the concept of biophilia. He encourages students to look for ways to “bring the outdoors in.”

I interpreted that as bringing it indoors: houseplants, wood furniture stone countertops. But the biophilia hypothesis suggests that we are also inclined to bring

the outdoors inside our minds — or, perhaps more accurately, our minds are programmed to embrace nature and seek comfort from it.

The growing body of evidence that natural or nature-like surroundings can make us happier and healthier, whether or not it's an evolutionary adaptation, has given rise to the concept of biophilic design: creating living spaces, workspaces and even public spaces that incorporate or mimic nature. This can range from things as simple as skylights or an abundance of houseplants to more elaborate upgrades like living plant walls or interior water features. In public spaces, it could be adding roof gardens or planting more trees or replacing plain expanses of lawn with diverse pollinator gardens.

On a large scale, biophilic design can take the form of restored wetlands, forest buffers along streams and green infrastructure. The Alliance for the Chesapeake Bay, where I work, knows something about this and has successfully led planting and restoration efforts across the watershed.

Green infrastructure work, particularly in urban areas, has ramped up, too. The RiverSmart team in Washington, DC, has seen interest in green infrastructure grow during the pandemic — likely because people are more in touch with outdoor spaces and therefore more likely to intuit the environmental benefits of stormwater management, tree plantings to reduce urban “heat islands” and increased pollinator habitat.

The Alliance enjoys bringing people closer to native plants and the watershed's natural systems, giving them the opportunity to contribute to the environment while reaping the benefits of close contact with nature.

The overarching idea behind biophilic design is that it “nurtures a love of place.” The more we connect with a place, innately or not, the more likely we will fall in love with it. What do we do when we love something? We take care of it.

The biophilia hypothesis and stewardship of our lands and waters play off each other harmoniously. Stewardship is our connection with nature in physical form. We all need to take time to reflect on our affinity with nature and the ways we connect to and take care of it. And the way it takes care of us. ■

Carly Starobin is the DC project associate for the Alliance for the Chesapeake Bay.

Rarely seen avian out-of-towners spotted this year in MD



By Mike Burke

Quiz time! In what state would you find a wood stork, roseate spoonbill and painted bunting? Florida? Yes, of course, Florida. But this year if you answered “Maryland,” that would be correct, too.

A male painted bunting kicked off the year with a surprise appearance along the C&O Canal National Historical Park at Great Falls. The bird was quite the sensation, even earning a Jan. 4 article in the *Washington Post*, complete with color pictures.

The adult male painted bunting is one of the most colorful birds in North America. A bright red underside stretches from its chin down to its tail. Equally bright, a blue head and shoulders set up a vivid contrast. He has a green back and additional red on his rump. This bird practically shouts, “Hey, look over here! Take my picture!”



The lavishly colored painted bunting, rarely seen in the mid-Atlantic until recently, has been spotted in nine Maryland counties so far in 2021. (Don Faulkner, CC BY-SA 2.0)

The bunting caused traffic jams outside the park as eager birders lined up for a closer look. He was a rarity, to be sure, but he wasn't the only one of his species seen in Maryland. In fact, painted buntings were seen in eight other Maryland counties in 2021. These birds are being spotted with increasing frequency in the mid-Atlantic and even farther north, suggesting that they may be expanding their range.

To see a true Maryland rarity, you had to be 150 miles to the east, at the Ocean City Inlet. On Jan. 5, a red-billed tropicbird was sighted there. Birder Suzette Stitely was with three others, checking out the many winter species that use the beaches and inlet, in addition to ocean birds flying by. The small group saw the extraordinary bird, and Stitely captured its image in flight with her Olympus camera and telephoto lens.

The red-billed tropicbird had never been documented in Maryland. Typically, it is found on the sea near its island breeding sites, which are scattered across the south Atlantic, Pacific, and Indian oceans and in the Caribbean Sea. It is mostly brilliant white, with black flight feathers, black streaks behind its eyes, a sturdy red bill and a pair of elegant streamers. Those amazing tail feathers double the length of the bird. In flight, it is simply gorgeous.

Florida sent us a limpkin, too — a medium-size wading bird that is the visual



The red-billed tropicbird doesn't ordinarily wander far from its breeding sites on offshore islands, mostly in the tropics, but the large white bird with distinctive streaming tailfeathers was spotted for the first time in Maryland in early 2021, near Ocean City. (Aftab Uzzaman, CC BY-NC 2.0)

opposite of the bunting and tropicbird. It is heavily streaked brown and white, a cryptic coloring that provides camouflage. The bird has a long, curved bill that is twisted at the end. That unusual feature is an adaptation that allows it to extract snails from their shells. The species specializes in apple snails found in hot, humid freshwater wetlands.

The limpkin ended up out of place in habitat as well as latitude. Fifty miles up the Potomac River from the District of Columbia, it took up residence at Snyder's Landing in Sharpsburg, MD (site of the 1862 Battle of Antietam). Recorded by a photographer in June, the bird remained in the foothills of the Appalachians through the end of August. It is only the fifth confirmed record of a limpkin in Maryland.

In July at North Beach, near the border of Calvert and Anne Arundel counties, a little egret appeared in the marsh. Looking remarkably like a snowy egret, this diminutive white wader has dull yellow feet, not the bright golden ones of the snowy. The bird is not native to the Americas but is common in Europe, southern Asia, and parts of Africa and Australia. It sometimes appears in the Americas when blown off-course by tropical storms or hurricanes.

Trumpeter swans have been seen in Bay waters sporadically for years during the winter. During their summer breeding season, though, these huge birds are in Alaska and other northern climes, including the western Great Lakes. Yet in the summer of 2021, for the first time, Maryland hosted three breeding pairs. The pair that settled on Hart-Miller Island was the first recorded successful breeding pair, producing three cygnets.

Mississippi kites have been gradually

moving their range north. The long-distance migrant typically breeds along the Gulf Coast and its namesake river. These kites selected the city of Rockville for the Maryland honor, becoming just the second recorded successful breeding pair of the species in the state.

A roseate spoonbill, the big, bright pink wader with the spatulate bill, was seen in Maryland in Prince George's, St. Mary's and Baltimore counties. Thousands of motorists got a view of the bird when it set down for a few days on a spit of land bordering the Washington beltway near the Woodrow Wilson Bridge.

A wood stork, that prehistoric-looking large wader, also made the trip north from its usual haunts in Florida. Like the painted buntings, wood stork sightings proved plentiful in 2021. The birds were seen in at least five Maryland counties over the summer.

So, what's going on with all these rare bird sightings so far this year? After breeding, many birds range far and wide. Some of what's happening is the usual post-breeding dispersal patterns in action. Clearly, other sightings are related to climate change, with southern species moving north in response to warming temperatures. The trumpeter swans may be heading south because of melted tundra. A few birds may be here because of severe weather, which is also related to a warming planet.

The simple fact is that we don't know why. Other Bay states are having equally exciting years. For once, I'll try not to overthink this one. The pure joy of birding is here. Go outside and see for yourself. ■

Mike Burke, an amateur naturalist, lives in Mitchellville, MD.

Culverts should be connections, not barriers, for stream life

BAY NATURALIST

By Kathy Reshetiloff

The Chesapeake Bay watershed contains thousands of miles of freshwater streams and rivers. These waterways support a diverse range of aquatic wildlife, such as fish, salamanders, turtles and freshwater mussels.

Land use changes and development affect habitat and migration for aquatic wildlife. Of particular concern are barriers associated with roadways.

Fragmentation of aquatic habitats by dams, culverts and other infrastructure is a primary threat to aquatic wildlife. There is a need to improve aquatic connectivity. Dam removals and fish passage projects open miles of rivers to many migratory fish species. But smaller barriers created by road crossings also must be addressed.

When not properly designed, the culverts (usually large steel or concrete pipes) that allow a stream to flow under a road can obstruct the movement of fish, fragment populations of other aquatic organisms and degrade water and habitat by changing natural water flow and depositing sediment.

But stream continuity — the uninterrupted connection of a river network — is not always the primary consideration when road-stream crossings are designed. The priorities tend to be public safety, durability, moving floodwater and, of course, financial considerations. Until recently, the safe passage of fish and other aquatic life was of secondary concern — or of no concern at all. But they aren't mutually exclusive interests; in most cases, a properly built stream culvert can be as nature-friendly as it is practical for humans.

Benefits to wildlife

Stream continuity is important for the reproduction of migratory and resident fish species. Spawning runs can range from short distances for resident fish to hundreds of miles for migratory fish. Stream continuity is especially crucial for striped bass, hickory shad, American shad, blueback



Culverts should be designed not only to avoid flooding but also to allow the passage of aquatic life. This less-than-ideally designed culvert on a Rappahannock River tributary was replaced with a steel bridge that allowed the stream to pass naturally underneath it. (Ben Hutzel, U.S. Fish and Wildlife Service)

herring, alewife, white perch, yellow perch and American eels.

Many fish species, such as brook trout, rely on coldwater habitats for refuge during warmer months. These coldwater habitats include groundwater-fed headwater streams that maintain cooler temperatures during the summer, as well as deeper pool habitats found along cool and coldwater streams. Access to coldwater habitat is crucial for the survival and maintenance of these aquatic communities.

Varied stream habitats have different prey and feeding opportunities depending on the location and time of year. For example, large predators, such as striped bass, will often travel to prey on schools of baitfish during certain seasons or times of day. The types of macroinvertebrates also vary greatly along the stream network, providing different feeding opportunities, depending on location. The fragmentation of streams by road crossings can reduce access to feeding areas, impacting fish communities.

In addition to fish, other aquatic, semi-aquatic and even terrestrial wildlife rely on stream corridors. Aquatic and semi-aquatic salamanders, frogs and turtles use streams and stream banks for daily and seasonal movement. A barrier at a road-stream crossing may force these species to move over land and across roadways, exposing them to predators and vehicles.

Unlike reptiles and amphibians, which move freely on their own, freshwater mussels require a host fish for dispersal. Mussels

reproduce by releasing larvae, or glochidia, into the water. The glochidia attach to the fins or gills of host fish and later detach to colonize new parts of a waterway. A stream crossing that blocks fish movements may also block the upstream dispersal of freshwater mussels.

Healthy populations of fish and other aquatic wildlife require the dispersal of individuals to maintain genetic diversity. Road-stream blockages can isolate populations, leading to populations being eliminated, reduced or damaged by inbreeding. Maintaining genetic diversity helps wildlife adapt to changing environments.

Problems at road-stream crossings

A so-called perched crossing — where the floor of the culvert is higher than typical water level on the downstream end — can be an impassable vertical barrier for aquatic fauna that are trying to get upstream but cannot climb what is essentially a small waterfall. Low water on the downstream end can make the situation worse.

Culverts that are simply not deep enough, relative to the stream bed, can also make passage difficult. During high streamflow, the water depth in the culvert may be sufficient, but not so in lower-water conditions.

Uniform-surface concrete or metal culverts provide no hiding or resting areas for aquatic organisms and are not ideal for those that travel along the streambed. Natural substrate, including rocks and finer

sediments, should match substrate characteristics of the surrounding stream.

If a culvert is too small in diameter, high flows can increase the velocity of the water passing through, making the upstream passage that much more difficult.

Undersized culverts can also be prone to clogging by woody debris, leaves and trash. Debris jams at the upstream end of crossings can inhibit passage and often make costly maintenance necessary to avoid flooding or structure failure.

What's a good road-stream crossing?

Here are the main characteristics of a well-designed stream crossing:

- Large enough for high water flows
- Open-bottom design that retains the natural stream bed
- Wide enough to reach from one stream bank to the other
- Water depth and velocity comparable to upstream and downstream conditions

For information about stream connectivity and improving road-stream crossings, visit the Chesapeake Bay Program website, Chesapeakebay.net, and search for “recommendations for aquatic organism passage.” That will take you to a page where you can download a document recently released by the Bay Program's Fish Passage Workgroup. ■

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