CHESAPEAKE
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Throngs of volunteers plant trees along a stream in Lancaster County, PA. If the fanfare and involvement doesn't also include maintenance beyond the initial planting days, the project could ultimately fail. (Allyson Wells)

Cruel world awaits neglected streamside buffers

≈ Without maintenance, tree plantings fall victim to rodents, invasive species – even outgrown tubes once meant to protect them

By Ad Crable

The "green" plan for the new shopping center carved from a historic farm in Lancaster County, PA, looked impressive on paper and in the newspaper: hundreds of native trees and shrubs would be planted along a stream to benefit water quality and wildlife.

But on a hot summer day only a few months after the vegetation had been embedded into the ground, Ryan Davis walked among the plantings and shook his head in disgust.

No mowing had taken place on the site, an essential practice to combat problems with invasive plants. No herbicide had been sprayed around the plastic tubes that shelter the trees, equally important to allow sunlight to reach under the tubes and prevent the growth of low greenery that attracts tree-girdling rodents.

Japanese hops, a highly invasive climbing vine that can grow 35 feet in a single growing season, was already climbing one of the tubes, bent on destruction. Invasive canary grass had started growing inside another tube, outcompeting the young pin oak there. "This one doesn't have much of a chance," muttered Davis, who manages a tree-planting and forest health initiative for the nonprofit Alliance for the Chesapeake Bay.

Another tube had fallen to an awkward angle, which will likely cause the tree, if it survives, to be misshapen. Some pieces of netting, initially placed on top of the tubes to keep out birds, had not been removed and the trees inside were entangled and corkscrewing downward.

Davis said the scene is too often the norm after streamside buffers are planted with much fanfare. And it's happening as buffers are being hailed as an affordable, effective way to help Bay states meet their lagging goals to reduce nutrient pollution.

Davis claims to have seen "hundreds" of riparian buffer failures throughout the years when landowners or other project partners didn't

Buffers continues on page 20

Scientists fear steep loss of Bay grasses lies ahead

≈ Preliminary findings suggest some of the Chesapeake's underwater grass beds were hurt by heavy rains, heat

By Karl Blankenship

Portions of the Chesapeake Bay's underwater grass meadows appear to be headed for steep declines this year, a delayed response to the torrential rains that poured vast amounts of water-fouling sediments and nutrients into the estuary during 2018.

Initial reviews of this year's aerial survey show significant losses of underwater grass beds in parts of the Mid Bay, where the bulk of the Chesapeake's underwater grass beds are located.

At the same time, preliminary reviews of the aerial images show that portions of the Upper Bay survived last year's deluge of muddy water surprisingly well, with grass beds even expanding in some areas.

"It's going to be a mixed story, as it always is," said Bob Orth, the Virginia Institute of Marine Science researcher who has been overseeing the aerial survey since its inception in 1984.

The full analysis of this year's survey, which is still under way, won't be available until early next year. But the broad picture is starting to emerge as Orth and others pore over the hundreds of aerial images gathered thus far.

Underwater grasses are one of the Bay's most critical habitats, providing food for waterfowl, juvenile blue crabs and many types of fish. Because they require clear water to survive, they are a closely watched indicator of the Bay's health.

Grass beds had been steadily expanding in recent years. They covered 104,843 acres in 2017, which was the largest amount observed since Bay cleanup efforts began in the mid 1980s.

Last year, scientists say the Bay grasses may have surpassed that level

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CHESAPEAKE BAY JOURNAL

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Editor's Note

2019 survey is your chance to tell us what you think

One of the most important things any publication can do is to better understand its audience. At the *Bay Journal*, we're making a concerted effort to do just that.

Last year, we mailed a survey for the first time to all of our readers — and we were overwhelmed by the response. More than 3,500 people replied.

It was such a large response that it took a while for us to even figure out how to handle it. And a surprising number of people had specific requests or questions. (I'm sorry I could not respond to each of them.)

This year, we're doing it again.

All but the most recent subscribers should soon be receiving their 2019 survey in the mail, and we'd greatly appreciate your taking a few minutes to fill it out. (We're better prepared to handle the response this year!)

Our budget is limited, so we can't do (or cover) everything. But reader feedback can be helpful in informing our decisions about topics to pursue.

Survey results are helpful in other ways, as well. They help us better understand how many people we reach and how people use our information.

For instance, we were surprised and pleased to learn that such a large portion of our readers take action based on what they read in the *Bay Journal,* whether planning for a trip, speaking up about issues or volunteering.

Understanding where people first learned about the *Bay Journal* is also useful because it helps us plan how to reach new readers.

A lot of readers indicated they'd like to see more coverage of issues farther upstream in the watershed, and we've been working to improve that.

Quite a few people also indicated that they didn't fully understand the scope of our operation or what it means to be a nonprofit news organization. So, this year, we mailed out our first-ever annual report to readers.

In the 2019 survey, we're asking some questions similar to those from last year, but are designed to get a bit more detailed information. And, we're asking some altogether new ones.

We're hard at work trying to build a better product for the future, both in print and online. Your feedback is invaluable as we move forward.

As journalists, we're often focused on reporting what other people are doing. This is our chance to get feedback about what we're doing. It is greatly appreciated.

— Karl Blankenship

Corrections

A photo in the July-August issue misidentified Baltimore Mayor Bernard C. "Jack" Young in a photo with Baltimore City students after signing the Children's Outdoor Bill of Rights. He is the man in the center wearing a blue blazer.

In the July August-*Chesapeake Challenge's Paddling* list/puzzle, the letter "A" was used to represent both the letter "C" and the letter "R."

The Bay Journal regrets the errors.

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Clockwise from left:

Tom Perry, owner of White Stone Oyster Co., examines floating cages of oysters in Bay waters off the tip of Virginia's Northern Neck. Harvesting out in the open, Perry thinks, produces better tasting oysters. See article on page 11. (Whitney Pipkin)

The freshwater marshes of Cat Point Creek, a tributary of the Rappahannock River in Virginia offer paddlers a glimpse of past landscapes. See article on page 24. (Dave Harp)

Each spring, a youth fishing derby is held along Mill Creek in Lancaster County, PA, to help a Plain Sect watershed group educate neighbors about the need to restore the stream in their midst. See article on page 19. (Myrna Smucker)

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Alliance honors environmental champions at Taste of the Chesapeake

By Kate Fritz

For the last 48 years, the Alliance has believed that the best results come from bringing people together to find common ground, then working to deploy "boots on the ground" to bring clean water projects to fruition. Building partnerships is in our DNA. We are privileged to honor four incredible champions this year at our 14th Annual Taste of the Chesapeake, Sept. 26 in Annapolis.

Each year, the Alliance selects an individual to recognize with our Frances H. Flanigan Environmental Leadership Award. This award was established in 2001 in honor of Flanigan's 23-year career of leadership and partnership-building throughout the watershed as executive director of the Alliance. The award recognizes a person whose longstanding commitment to the restoration and protection of the Chesapeake reflects the Alliance's mission of fostering diverse partnerships and building local action to inspire environmental stewardship.

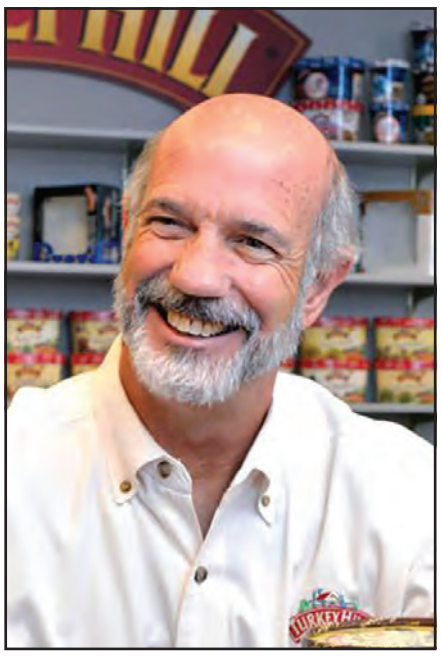
This year, we are honored to present the 2019 Flanigan award to **John Cox**, former CEO and chairman of the board of Turkey Hill Dairy.

In partnership with the Alliance and the Maryland Virginia Milk Producers' Cooperative Association (MDVA), John was a driving force in building the Turkey Hill Clean Water Partnership. The partnership was created to support efforts by farmers in Pennsylvania's Lancaster County to improve the health of Lancaster's rivers and streams. Through this initiative, Turkey Hill is leading the way for the private sector to do its part for clean local streams and rivers in the Lancaster area.

In 2018, the Alliance met John at a Businesses for the Bay networking forum that we hosted in coordination with the Lancaster Chamber of Commerce. Our Pennsylvania state director, Jenna Mitchell, asked him how many of the farmers supplying milk to Turkey Hill had conservation plans. He took that question back to Turkey Hill, then worked with their dairy supplier, MDVA, to include financial incentives. Turkey Hill pays farmers a premium for their milk once they come into compliance with conservation plans.

The Alliance has helped leverage about $1.5 million in funding from the Natural Resource Conservation Service and National Fish and Wildlife Foundation to help MDVA farmers providing milk to Turkey Hill with implementing practices on the ground. With more than 140 farmers participating, this partnership, driven by Cox's vision and energy, is driving major improvements to local water quality in Lancaster County.

This project demonstrates that leadership in the private sector can accelerate conservation actions — leadership John has been vocal in helping to replicate in other CEOs and businesses. Turkey Hill has made information about their practices freely available to motivate other businesses to adopt similar approaches. As the partnership has grown, its successes have shown that the effort is replicable in other agricultural industries.



Clockwise from far left, John Cox will receive the Frances H. Flanigan Environmental Leadership Award. Katherine Antos, Kimberly Hickey and the Rev. Patrica Gould-Champ are the 2019 Watershed Champions. (Submitted photos)

The Alliance is proud to honor John with the Fran Flanigan Leadership Award for his significant strides in creating innovative public-private partnerships that make a big impact on the land and water in the Lancaster area as well as the Chesapeake Bay watershed. Thank you, John, for your leadership in the restoration movement!

The Alliance will also honor three Watershed Champions at our Taste celebration for their outstanding contributions to the Chesapeake watershed through innovative thinking, initiative, and the development of inspiring and impactful partnerships to advance stewardship in the region.

Katherine Antos had an impressive start to her career at the U.S. Environmental Protection Agency's Chesapeake Bay Program, where she crafted a 15-year plan in partnership with the six Bay states, the District of Columbia, and the federal government that was instrumental in establishing a road map for pollution reduction goals in the Chesapeake Bay for 2025.

In addition, as an ambassador for the Anacostia River under the Urban Waters Federal Partnership, Katherine worked with government, watershed and community-based organizations to restore the river and enhance opportunities and access for underserved neighborhoods. She aspired to deepen community organizations' engagement around the future of Anacostia Park, climate adaptation and watershed restoration.

Katherine is the branch chief for the DC Department of Energy and Environment "Partnering and Environmental Conservation Branch," which brings together District and federal agencies, nongovernmental organizations, businesses and residents to restore and preserve the District's waterways. She works to improve water quality, manage stormwater, reduce litter and enhance the District's resilience. The Alliance is thrilled to be honoring Katherine as a Watershed Champion at this year's Taste for her work to activate District residents in environmental projects and enhancing community resilience.

Kimberly Hickey, one of the founding members and leaders of the Stormwater Disciples at Asbury Broadneck United Methodist Church, was the backbone and driver of an extraordinary effort that brought together watershed groups, government agencies and practitioners to address the severe flooding issues at the church's hallowed and historical cemetery.

Throughout the project, Kimberly collaborated with both internal and external partners to facilitate discussions around the issues, brainstorm solutions and shepherd a stream and wetland restoration project from conception to completion. She even spearheaded a community volunteer day to install plants in the wetland portion of the project.

Kimberly serves as the treasurer for Asbury Broadneck United Methodist Church and is an Anne Arundel County Watershed Steward (class of 2017). Because of Kimberly's championship efforts — along with the efforts of the rest of the Stormwater Disciples — the church's stream and wetland restoration project protects the cultural and natural resources that are so very important to her community and the region. The Alliance is honored to be celebrating Kimberly as one of our 2019 Watershed Champions!

The **Rev. Patrica Gould-Champ** of Faith Community Baptist Church has been a driving force behind an extraordinary project that quickly outgrew the initial concept and soon became something much more important. In 2016, the Alliance received funding from the National Fish and Wildlife Foundation to form partnerships with the faith community to engage congregants in our RiverWise program in Virginia. The program's goal was to link creation care with stormwater pollution reduction on church properties with hopes that congregants would carry the ideas and principles of these practices into their personal lives and begin making changes at home.

But when the Alliance began working with the Rev. Gould-Champ and Faith Community Baptist Church, something much more powerful began to take place. Rather than just installing stormwater practices, the Alliance's funding was able to help support Faith Community's larger goal of addressing food justice issues in the East End of Richmond. Faith Community installed a solar-powered rainwater harvesting system, fruit trees, a berry patch, a native plant and meditation labyrinth, six raised gardens in which eggplant, squash, zucchini, cucumbers, tomatoes, basil and other vegetables are planted, and an African keyhole composting garden. These gardens, named the Garden of Hope by the congregation, became the beginning of a much larger effort to create a local farmer's market in the heart of a community with high impervious cover, and little access to affordable fresh locally grown food.

The Alliance is excited about the direction that this project is headed, and would like to honor the Rev. Gould-Champ, and the entire congregation of Faith Community Baptist Church, for their inspirational leadership in creating a sustainable and healthy community.

Our environmental award winners are representative of many others whose dedication inspires all of us every day.

We invite you to join us at our 2019 Taste of the Chesapeake on Sept. 26 in Annapolis to celebrate these inspiring environmental leaders and champions, and to support the Alliance's critical work to bring together communities, companies and conservationists to improve the lands and waters of the Chesapeake Bay. For information about our Taste, please visit allianceforthebay.org/taste.

Kate Fritz is the executive director of the Alliance for the Chesapeake Bay.

Scientists seek to elevate rare frosted elfin butterfly's numbers

≈ Stabilizing the population is key to avoiding the endangered species list

By Jeremy Cox

Frosted elfin butterflies aren't much to look at. Their 1-inch wingspan and brownish-gray wings give them the appearance more of a moth than a majestic monarch butterfly.

Jennifer Selfridge doesn't see them that way, though. Thirteen years after her first glimpse of the species on the site of a recently cleared Maryland forest, her voice still crackles with excitement.

"It was fantastic," said Selfridge, an invertebrate ecologist with the state's Department of Natural Resources. "A lot of times when you go out to find a species that is rare, you're lucky to see one or two — and on this day, I saw dozens of them. I lost track of time and got a really bad sunburn."

Selfridge — part butterfly hunter, part researcher — has channeled that energy into studying the elfin's mysterious life cycle and coordinating Maryland's efforts to restore leafy havens for the species. But habitat loss throughout its eastern U.S. range and the butterfly's own selective diet have all but grounded scientists' hopes of elevating its numbers.

The butterfly is listed as endangered or threatened by a dozen states — but not by the federal government. After a 2018 species assessment raised as many questions as answers about the elfin population's health, the U.S. Fish and Wildlife Service this year dispatched survey teams across its range to shed more light on its status.

Chris Guy, a U.S. Fish and Wildlife Service biologist, and Jennifer Selfridge, a Maryland Department of Natural Resources invertebrate ecologist, check for frosted elfin butterfly caterpillars on a yellow wild indigo bush at a state-owned forest in Worcester County. (Dave Harp)

The agency is set to decide whether to list the species in 2023. In the meantime, officials are collaborating with local governments and nonprofits to improve conditions so that elfins don't need to be listed.

"Right now, there's a lack of information about the population," said Kathy Reshetiloff of the USFWS' Chesapeake Bay office in Annapolis. "We're trying to get ahead of the ball, so we don't have to list the species."

Why so much fuss over a relatively unremarkable butterfly? Protecting elfins, conservationists say, would go a long way toward preserving their preferred landscape. The species dwells in sunny savannas and pine barrens. Those habitats are rare because they rely on regular doses of fire, mowing or some other type of human hand to keep from getting overgrown and shaded.

Scientists say the loss of such landscapes to overgrowth and development has not only lowered the frosted elfin butterfly's numbers but also those of the eastern hognose snake, the Karner blue butterfly and two types of birds, the whip-poor-will and eastern towhee.

Making certain forests more hospitable to elfins has a multiplying effect across the ecosystem, Selfridge said.

"If you put the time in to manage the habitat, it can restore the species," she said. "It's just having the will to do that."

Elfins can be found in 25 states, largely in a belt from eastern Texas to Massachusetts. They don't appear just anywhere in those states, though. They feed on only two types of plants — lupine and wild indigo — and generally don't flutter far from them.

Scientists have counted nearly 400 elfin clusters across its U.S. range.

ELFIN CONTINUES ON PAGE 6

ELFIN FROM PAGE 5

But according to the 2018 Fish and Wildlife assessment, which was based on existing scientific literature and input from experts like Selfridge, the condition of more than four out of five of those populations is unknown.

As they prepare their species determination, USFWS officials would like to know how many elfins there really are, where they currently live, what threats they face and whether more suitable habitat exists. The agency hired survey crews to fan out across the butterfly's range this spring and summer to help answer those questions.

To understand the plight of the frosted elfin butterfly, follow Selfridge into the field with a group of graduate students and Fish and Wildlife officials.

The setting: early summer on the same property where Selfridge spotted her first elfins. The 600-acre tract has since been sold and is now managed as part of the Pocomoke State Forest. The site is about 30 miles southwest of Ocean City and a world away from its neon lights and tacky T-shirt shops.

The frosted elfin butterfly feeds on only two types of plants: lupine and wild indigo. This caterpillar is feeding on a yellow wild indigo. (Dave Harp)

The terrain gently climbs and falls — unusual for the otherwise flat-as-a-griddle Eastern Shore. This, Selfridge pointed out, was once a prehistoric sand dune. Today, it's mostly covered in oak trees, pines, blueberry bushes and goldenrod.

Clad in long sleeves and pants against the mosquitoes and ticks, the pack trudged up a sandy track that used to serve as a logging road. Suddenly, the dense canopy gave way on one side of the path to a bowl of sunshine, where loggers clear cut about 60 acres earlier this year. That should provide fresh habitat for the sun-loving lupines and indigo that elfins rely on, Selfridge said.

She knelt beside an indigo bush on the side of the road and began examining its tear-shaped leaves and yellow flowers as if she were paging through a book.

"Oh, and we've got a caterpillar," Selfridge announced. A green, slug-like blob was just barely visible on one of the stems.

It often takes a trained eye to spot elfins. To most observers, their only distinguishing characteristic is the frosted-looking tips of their wings.

Elfins spend no more than two to three weeks as adult butterflies. In the mid-Atlantic, typically from late April to mid-June. That short window is given over to a frenzy of feeding, mating and, in the female's case, finding wild indigo or lupines on which to deposit eggs.

For the next generation, the life cycle goes on: An elfin spends about one week as an egg, five to six weeks as a caterpillar and the rest of the year and the first few months of the next inside a chrysalis.

Selfridge's research has revealed that elfins that feed on lupines are the same subspecies as the ones whose diets consist of indigo — contrary to what some researchers had speculated. She also has shown that the butterflies tend to spend their pupa stage just above the soil surface, suggesting that land managers ought to be careful with how and when they conduct prescribed burns.

A frosted elfin butterfly has a wingspan of only about an inch. It is distinguishable by the dappled, " frosted" look along the edge of its wings. (Submitted by Harvey Tomlinson)

In the Chesapeake basin, elfins are classified as endangered in Delaware and Maryland and threatened in New York. In Maryland, they are found in one cluster in Garrett County on the far western side of the state and in four or five clusters on the Eastern Shore, Selfridge said.

The centerpiece of Maryland's elfin collection is that 5-acre plot at the end of the Pocomoke forest logging road where Selfridge had first gone looking for the species all those years ago. For some reason, lupines and indigo sprang up here after one particular tree-clearing operation, and elfins weren't far behind.

Any question about the site's ecological importance is answered by the pair of electrified yellow wires that surround it. The wires have kept hungry deer at bay for seven years, Selfridge said. She and some colleagues had once tried transplanting some lupine elsewhere on the property to expand the habitat, but it died after their first winter.

After walking the width of the protected area, Selfridge turned back down the logging road. She is optimistic that elfins can avoid the federal endangered species list.

"I'm hopeful we can find more populations, figure out the distribution and do the work we need to do to keep the population stable and increase the distribution," she said. "If it's off the list, that means it's doing better, and that's what everyone wants to see."

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Shoreline industry poses hazards as sea level, floods increase

≈ Study says vulnerable communities are especially at risk of exposure to toxics

By Sarah Vogelsong

Throughout history, wherever there has been industry, there has been a waterway.

Whether river, sea or ocean, these bodies of water have long appealed to businesses, which have harnessed their flow to generate power, cool machines and technology, and ship their goods all over the world.

Without the Merrimack and the Concord, Lowell would never have become the hub of textile manufacturing. Without the Monongahela, Pittsburgh steel would never have forged the modern world. Without the Detroit River, the Motor City would never have attained its global fame.

But with the Earth warming and sea level rising, many riverside clusters of industry are ground zero for rising waters — posing a new risk for the environment and those living nearby.

In a report issued this spring, the Center for Progressive Reform finds that almost 1,100 industrial facilities in Virginia's James River watershed that use state or federally regulated chemicals are exposed to both potential flooding and projected sea level rise. Worse, they are located in socially vulnerable communities where residents have the fewest resources to escape a disaster's effects.

The *Toxic Floodwaters* report, produced in partnership with the James River Association and Chesapeake Commons, contends that severe floods aren't the only concern. Just one foot of sea level rise will flood 91 of these facilities, while 234 will be flooded by sea level rise of 1–5 feet.

"We've had several wake-up calls about the extent of contamination that can happen from floodwaters," said Noah Sachs, one of the report's authors and a professor at the University of Richmond. "So why is it that we sometimes focus on preventing a one-in-a-million increased risk of cancer with our environmental laws? … I think that we're ignoring a much, much bigger danger to our communities."

"Toxic floodwaters," a term coined by Sachs and co-author David Flores, a policy analyst with the Center for Progressive Reform, are the contaminated waters that are discharged from industrial facilities during floods.

The James River watershed is particularly vulnerable to this danger because of two factors. First, it is heavily industrialized, with major agglomerations of facilities containing toxic or hazardous chemicals in Hampton Roads, Hopewell, Richmond and Lynchburg.

Dominion's Chesterfield Power Station is located on the James River, VA. (James River Association)

Second, Tidewater Virginia is experiencing the second most rapid rate of sea level rise in the nation, behind only the Gulf of Mexico region. And that rise, Sachs said, will affect not only coastal areas, but regions inland along the river — "upstream all the way to Richmond, every inlet, every part of the estuary, every tributary that has tidal waters."

The watershed is also highly populated, home to an estimated 2.9 million people. Of those, almost half a million are defined as "socially vulnerable," a term used by the Centers for Disease Control and Prevention to measure a community's resilience to external stresses on human health, natural or human-caused disasters, or disease outbreaks.

"In the event of climate and chemical disaster, a household without reliable transportation to evacuate may be immobilized in their homes and exposed to toxic contamination from floodwaters," the report finds. Such a household might also not have access to temporary housing or lack the means to fully address the contamination in and around their homes, leading to longer exposure.

Urban areas are more likely to be affected by toxic floodwaters because of their high concentrations of industry and denser populations, but rural areas are also vulnerable. Coal ash storage pits, which contain toxic substances like arsenic, lead and mercury, are one possible threat. Another is agricultural waste.

The scale of the impact of agricultural waste was illustrated by Hurricane Florence in 2018, when more than 100 lagoons containing hog waste in North Carolina either overflowed or breached their walls, causing extensive water contamination. Nearly 20 years earlier, Hurricane Floyd caused identical impacts, which officials told the *New York Times* "might have been averted."

These are only a handful of precedents cited in Toxic Floodwaters as evidence that the report's headline issue is not just a potential problem, but a pattern already unfolding.

In Virginia, the chronicle of disasters includes the Election Day Flood of 1985, in which pesticide spills led to cattle deaths; flash flooding in Covington in 2016 that knocked over oil drums, causing an environmental hazard; and numerous wastewater overflows and landfill washouts in large-scale storms such as hurricanes.

The toppling of the Covington oil drums reveals that, when it comes to floodwaters, environmental risks can assume many guises.

"This isn't just an issue for the chemical industry," Sachs said. "It's large– and small-scale manufacturing. It can be an agricultural supply center. It could be a company that is storing powdered pesticides outdoors."

Such potential hazards are "commonplace, and they're right next to residential neighborhoods," he said.

But it is not all doom and gloom: The report asserts that the harms from climate-driven chemical disasters can be reduced.

In that effort, Sachs and Flores are clear that private industry should "bear most of the burden of preventing toxic floodwaters," but that government must also assume a more forceful stance to hold companies accountable.

Sharing information is a key part of this charge.

The federal Emergency Planning and Community-Right-to-Know Act of 1986 requires states to disclose data about any federally recognized hazardous chemicals that are stored or released by facilities within their borders. But Sachs said that the Virginia Department of Environmental Quality has recently restricted access to information about the types of chemicals being stored and their locations. (The DEQ does annually make public Virginia's Toxics Release Inventory, which details all significant chemical releases in the state.)

"DEQ should immediately reverse its recent policy on public disclosures of Tier II data and should make this hazardous chemical storage data freely accessible to residents through online access, as other states, such as Illinois, have already done," the report urges.

Other key recommendations include establishing new regulations to oversee above-the-ground storage tanks as well as containing coal ash waste in landfills that are not exposed to flooding under current or future projections.

Both Flores and Sachs emphasized the value of a statewide analysis of chemical flood risks, which Flores called "totally necessary and justified."

"We have every intention and desire to export this analysis to other watersheds," he said.

Report: 'Sunny day' floods a rising threat in Chesapeake region

Communities are already experiencing record numbers of deluges and frequency is expected to increase in years ahead

By Jeremy Cox

As floodwaters rose last year, so did records across the Chesapeake region.

A new National Oceanic and Atmospheric Administration report, shows that rising seas are inducing a particular type of increased flooding around the country. The phenomenon, known as high-tide or "sunny day" flooding because of the absence of rainfall as a trigger, struck a median of five days last year at nearly 100 coastal locations, tying the record set in 2015.

The "median" is the level at which there are as many occurrences below the value as above it.

The problem was worse in the Northeast, which includes the Chesapeake watershed. The report, released on July 10, showed this region with a median of 10 days of high-tide flooding. These following Chesapeake area cities carved out new records:

- Washington, DC, 22 days
- Lewisetta, VA, 15 days
- Annapolis, MD, 12 days
- Baltimore, 12 days

Overall, a dozen locations nationwide broke or tied their high-tide flooding records, NOAA said.

High-tide or sunny-day flooding strikes in Cambridge, MD. (Dave Harp)

Don't expect to dry out anytime soon. This year is projected to be another higher-than-normal year for 40 locations around the nation as a minor El Nino, the periodic phenomenon that brings more rain to much of the United States, lingers into early next year, researchers said. The national median frequency of high-tide flooding is expected to be twice as high as it was in 2000.

The Northeast Atlantic is forecast to have a median of eight days of flooding, up 140% from 2000.

New records for such flooding are expected to be set next year and "for years and decades to come" as seas continue to rise, according to the report. The number of high-tide days is predicted to reach a national median of 25–75 days by 2050, depending on how much action is taken to reduce global emissions of greenhouse gases such as carbon dioxide.

High-tide flooding is already wreaking havoc across the country, disrupting traffic, exacerbating beach erosion and lowering property values, according to the report's authors. Another consequence they point to cites *Saltwater intrusion laying waste to Delmarva farms as sea level rises*, a March 2019 article *Bay Journal*, which described how high-tide flooding is contributing to saltwater intrusion on cropland on the Delmarva Peninsula.

"Once communities realize they are susceptible to high-tide flooding, they need to begin to address the impacts, which can become chronic rather quickly," said William Sweet, a NOAA oceanographer and lead author of the report. "Communities find themselves not knowing what to expect next year and the decades to come, which makes planning difficult. Our high-tide projections can play a vital role in helping them plan mitigation and other remedies."

The evolution of high-tide flooding at Sewell's Point, near the mouth of the Chesapeake in Virginia, offers a glimpse of what many area communities have seen — and can expect to see in the future.

In 2000, Sewell's Point recorded five high-tide days. Last year, it saw 10. And this year, NOAA is calling for 10–15 such days. By 2050, that number could soar to as much as 170 if carbon dioxide emissions remain high.

Options to rebuild oyster population in MD draw criticism

≈ Watermen unhappy about proposed harvest limits while others say state is not moving fast enough

BY TIMOTHY B. WHEELER

Maryland watermen face potential cutbacks in their wild Chesapeake Bay oyster harvest starting this fall, as the state eyes new regulations aimed at eventually making the troubled fishery sustainable. But critics question whether the state is serious about ending overharvesting, and lawmakers could order a do-over.

Officials with the Department of Natural Resources told their Oyster Advisory Commission in August that they were considering reductions of up to 20% in the daily harvest limits and setting a shorter season, which has traditionally run from Oct. 1 through March 31.

They also suggested they might close some areas of the Bay to wild harvest for the coming season if available data indicates oysters are unusually scarce there or the areas were being heavily overharvested.

DNR officials even indicated they were mulling steps to curtail the recreational harvest of oysters, though it's unclear how meaningful that would be.

The changes are being considered in response to a scientific assessment last year of the state's oyster stock, which found the number of market-size bivalves had fallen by half since 1999 and that more than half of the areas open to wild harvest have been overharvested.

Bill Anderson, an assistant DNR secretary serving as acting fisheries director, said the department has yet to decide which, if any, of the changes to make. He said new rules would be announced before Oct. 1, using the authority under its new oyster management plan to adjust fishery regulations by public notice, with 48 hours of lead time before they would take effect.

In the past, changes to fishery regulations had to go through a more protracted process, which could take several weeks to months.

"We wanted to get things in place quickly," Anderson said, "so we wouldn't waste another year on moving us forward on our new enhanced plan."

DNR officials say that with the management plan they drew up earlier this year, and which recently cleared legislative review, they aim to make the wild oyster fishery sustainable in eight to 10 years.

DNR officials asked their advisory commission to indicate which changes they support for the upcoming season.

But some members complained the department didn't provide any information by which to evaluate the measures' effectiveness. And they questioned how the DNR would know whether it was making progress because the state hasn't set a target for optimal oyster abundance to maintain the population.

Scott Kettering and Robbie Tolson tong for oysters aboard the Miss Robyn on Broad Creek, a tributary of the Choptank River. (2013 / Dave Harp)

"I feel like we're being put in a box here," said Allison Colden, Maryland fisheries scientist with the nonprofit Chesapeake Bay Foundation and a commission member. She questioned whether state officials were committed to ending the overharvesting found in last year's stock assessment. One of the options, for instance, called for closing areas only when the harvest reaches a level nearly twice what scientists consider excessive.

In an email after the meeting, Colden called the options discussion "a complete farce." She noted that information presented to the commission previously had shown that relatively few watermen catch their daily limit of oysters now, and that most go out for no more than half the season. The regulatory options the DNR floated "are not likely to have any impact," she said, adding that she suspected that was the DNR's intent — to present paper reductions that wouldn't really affect watermen.

"Natural resources management decisions are not a popularity contest," she said. "It's up to the department to do their job to use the best available science to produce a sustainable fishery. And I think they have totally and knowingly failed."

Conservationists and seafood industry representatives have been at odds for years about how to manage oysters, which scientists estimate have declined to 1% or less of their historic Baywide abundance after decades of overharvesting, habitat loss and disease.

With harvests continuing to decline in recent years, watermen have pushed to reopen some of the extensive oyster sanctuaries established by the state in 2010, arguing without evidence that oysters thrive best on reefs that experience some harvest. Gov. Larry Hogan's administration proposed to do just that, but the General Assembly blocked the move and instead ordered the DNR to conduct its first-ever scientific assessment of the state's oyster stock.

That review found that the number of market-size adult oysters waxed and waned but had declined by 50% from 1999. It also found that overfishing was occurring in 19 of 36 areas of Maryland's portion of the Bay and its tributaries.

The DNR plan, unveiled last winter, lays out 22 strategies and 82 different actions for managing the wild fishery and aquaculture operations while also restoring the oyster population for its ecological benefits as water filterers and aquatic habitat.

But the DNR's oyster management plan has proven controversial, as conservation groups have complained it doesn't go far enough.

"You can end overfishing right now. You do not need eight to 10 years," Colden said. "What you may need is eight to 10 years to rebuild the stock, but you can't do that because we don't have an abundance target."

Anderson said DNR officials expect that goal will become apparent over the years as the state goes through a "spiral" management process of annually tweaking its regulations and assessing whether the population responds. He said regulators took a similar approach to stabilizing and rebuilding the Bay's blue crab population, a pillar of the region's seafood industry once also in trouble from overharvesting.

Ann Swanson, executive director of the Chesapeake Bay Commission, who had been involved in the bi-state crab management overhaul, challenged that assertion, saying that biologists from Maryland and Virginia had developed a goal for restoration of the crab population early on.

After the meeting, Swanson said, "I can understand if they wanted to start with some initial restrictions. We know that we are overfishing now, and we need to at least begin trying to manage it. And I get that… But you should be focused on developing a target so you know your goal and you can be communicating that to all of your stakeholders."

Watermen, meanwhile, viewed the harvest reduction options warily because they could come after five straight years of declining harvests.

"We're talking about another reduction for the industry, another cut," said Charles County waterman Bill Kilinski, a commission member, "and there's nothing we're going to get in return out of this."

"Please don't put me out of business," pleaded Bob Whaples, president of the Dorchester County Seafood Heritage Association, who spoke up from the audience.

The DNR could be forced to go back to the drawing table next year. Earlier this year, the General Assembly overwhelmingly approved legislation requiring the DNR to revamp its Oyster Advisory Commission and develop its management plan by seeking consensus among often-disputing conservationists and watermen.

Hogan vetoed the legislation, accusing lawmakers of making an "end run" on his administration's "thoughtful and science-based" efforts to manage oysters. But legislative leaders have vowed to vote to override the veto when they meet again in January.

In another sign of the deep divide in Maryland over oyster management, the Oyster Advisory Commission also split in August over whether to seek federal permits to dredge buried oyster shells from the Upper Bay and use them to replenish dwindling habitat for newly spawned bivalves.

Robert T. Brown, president of the Maryland Waterman's Association, called for the DNR to seek the permits

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Open-water sites producing oysters with Bay's briny sweetness

≈ Bivalve farmers weather the storms of wind and waves instead of those from landowner opposition

By Whitney Pipkin

When Tom Perry set out to start an oyster farm at the age of 26, he wasn't interested in doing it the easy way.

He might have opted to raise oysters in a cage on a patch of leased bottom near the shore of Virginia's Northern Neck. Instead, the crew from his White Stone Oyster Co. pilots a workboat each morning out of the safety of Antipoison Creek and into the wide, sometimes blustery waters of the Chesapeake Bay.

There, the *Crassostrea virginica* oysters grow in mesh bags inside cages hovering just below the surface of the water. The plastic floaties that support them bob like decoys in the distance. If that sounds peaceful, wait until the wind kicks up and the boat — which the captain is trying to guide between unwieldy rows of cages and lines — starts rocking, too.

"You can see some of the headaches you have to deal with out here," Perry said, after the boat's propeller got caught in an underwater line he was just saying needs to be removed. It's not the first time it's gotten in the way, but "it just never makes a lot of sense to do the things that don't directly give you more oysters."

Tom Perry, owner of White Stone Oyster Co., pulls a floating cage out of Bay waters off the tip of Virginia's Northern Neck. Harvesting out in the open, rather than in a river, can be more difficult for the crew, but Perry thinks the oyster's flavor and shape benefits from the wilder, brinier waves. (Whitney Pipkin)

But when Perry, now 31, decided to grow oysters in this open-water location, he wasn't focused making the job easier. Instead, he said, "I spent a lot of time trying to understand what an oyster really wants and then worked back from there."

Oyster aquaculture in the Chesapeake Bay has ballooned over the last decade. In Virginia, which leads the East Coast in eastern oyster production, the number of oysters planted for cultivation has grown from a few million in 2005 to 135 million a decade later, according to an annual survey conducted by the Virginia Institute of Marine Science. The most recent of those surveys found that shellfish aquaculture in the state brought in $53.4 million for farms in 2017. Hard clams represented about 70% of those sales, but oysters are the industry's fastest growing sector.

With the surge in production, more growers are looking to differentiate their products and test the potential of new growing spaces. Commercial oyster production can take many forms, depending on the type of lease a grower pursues, and oysters can be ready for harvest year-round. They can be grown to market size in bags or cages, sunk to the river bottom or floating near the top of the water column. Raising oysters in floats on the surface — where

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as a way to offset the current shortage in hatchery-raised oyster larvae.

Brown and others said that if there were more reefs built up with shell, natural oyster reproduction would more than make up for the shortfall, which is believed to stem mainly from extremely low salinity this year that caused larvae to die off.

Conservationists argued that the dredging should only be considered as part of a larger restoration plan using both shell and alternate substrate, such as granite or concrete. And they elicited an acknowledgement from the DNR that federal fish and wildlife authorities had questioned the proposed dredging because the sites are in waters where striped bass, another troubled species, spawn every spring.

Brown pressed the case, saying that the state must act to avoid losing a year in its efforts to rebuild the oyster population.

The DNR already has a permit from the U.S. Army Corps of Engineers to dredge up to 5 million bushels of old shells from a large reef outside the mouth of the Patapsco River known as Man O' War Shoal. Though strongly supported by many watermen, it's opposed by environmentalists, recreational anglers and even Baltimore County watermen, who have planted some oysters there. The state Board of Public Works has yet to even discuss whether to approve the controversial project, a necessary final step.

By a narrow majority of those present, 8 to 7 with one abstention, the oyster advisory commission urged the DNR in August to seek the new dredging permits. But Swanson said the real importance of the vote was that it showed how divided the group remains.

"That's no way to manage a fishery," she said.

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food is plentiful enough to bring bivalves to market-size faster — is a small but growing practice. But it's not without challenges. Leaving cages floating at the surface, particularly near the shore, can make them a lightning rod for opposition from landowners who'd rather see their waters left open for the view or for recreation. Strong storms could also rip cages left at the surface from their moorings and leave behind debris.

But today, advancements in the gear that supports floating cages makes them able to withstand increasingly severe weather in waters farther from the shore. Better systems also are addressing some of the other factors that make this brand of oyster farming so inherently difficult.

But what the open-water location lacks in ease, Perry said, it makes up for by producing a superior oyster: Faster-flowing waters carry more nutrients to the budding bivalves, their cages moored in place by a system of underwater lines. Constant friction from waves create a smoother, deeper-cupped shell. And, far from the rivers' sometimes mucky waters, increased salinity affords the oyster meat a pleasant, briny-sweet flavor not unlike that of West Coast oysters.

Harvesting from neat rows of oyster cages under a rising sun in the open waters of Fleets Bay, Perry admitted, the view isn't so bad either. But, on a windy day, or in the thick of winter, the job can be downright harrowing.

"That's where having a Tangier waterman on that boat comes in handy," said Tim Hickey, cofounder of the Tangier Island Oyster Co., which also farms the open waters in the center of the Chesapeake Bay. "Those guys are thinking about time, wind direction, approach. If I were behind the wheel, I'd be a mess."

Hickey and his partners founded the company in 2014 in part to bring the economic benefits of oyster farming to erosion-prone Tangier Island. Now, the crew harvests about 1 million oysters a year, some of which sell for $3 apiece on the half-shell at restaurants such as Fiola Mare in the District of Columbia, where Hickey lives.

If the way chefs rave over these open-water oysters is any indication, they could be a wave of the future.

For White Stone Oyster Co., daily beatings from waves buffet the bivalves into more uniform shapes, developing deeper cups ideal for holding thick, juicy meat. (Whitney Pipkin)

Jeremiah Langhorne, executive chef of The Dabney in the District of Columbia, told *Bon Appétit* that White Stone oysters taste as if "a very talented chef opened the top, seasoned the oyster perfectly and put the lid back down." *Martha Stewart Living* said oysters from the Tangier Island company taste "like that first whiff of sea on a spring morning," describing a balance of salty and sweet, earthy and mineral flavors.

In the case of both farms, the oysters' clean flavor comes from their locale, which is far from the sediment of river bottoms where most Bay oysters are grown. Increased salinity in Bay waters also lends a brinier flavor to the bivalves, something that appeals to Americans who are more likely weaned on West Coast varieties.

"The techniques that Tom and them are using are really setting the standard now for aquaculture," said Devin Rose, chef and proprietor of Adrift, a restaurant in White Stone, VA. "In a sense, it's a totally different product."

Rose, who grew up on the Northern Neck before working at Michelin-starred restaurants in Virginia and California, said having access to seafood products like White Stone's is part of what brought him back. He remembers eating wild Chesapeake oysters while growing up, before Virginia aquaculture took off, and didn't realize how far the industry had come until he returned.

White Stone's oysters were featured in a *New York Times* magazine article that questioned whether farmed oysters are becoming so uniform and balanced that they are more like "a designed object" than wild oysters. But Perry — who lives in Richmond with his wife and two children younger than 3 — said all he did was pick a spot that does the work for him.

While many near-shore aquaculture operations run their oysters through a tumbling machine to help buffet them into tidier shapes, daily beatings from waves perform this task on open-water oysters. The steady pressure forces the shells to clamp down, developing deeper cups ideal for holding thick, juicy meat and smoothing the shell's pearlescent exterior.

"By using a heavy-duty cage and being in the open water, these oysters are tumbling themselves, and they tend to grow at the same level," said Myron Horzesky, chief operations officer of Massachusetts-based Ketcham Supply Co., which sells Flow N Grow floats and cages used by open-water farmers. "When you see these oysters, it looks like a cookie cutter has been stamping them out."

These oysters, suspended in bags spaced across the cage's compartments that allow room for them to grow uniformly, receive a steady flow of plankton at the top of the water column. An added advantage, Horzesky said, is that growers can periodically flip the cages over — so the pontoons are on the bottom and the cage is exposed to the open air — allowing their shells to dry for several hours and kill off microorganisms that compete with oysters for food.

A study by Woods Hole Sea Grant in Massachusetts found that oysters in floating cages had a higher survival rate and faster daily growth rate than those grown with bottom gear. A study in Canada had similar findings. The Massachusetts study did advise growers to test new gear on a small scale to determine if it's the best fit for a certain locale and to research whether local permitting allows for various gear types.

Both Perry and Hickey said they were breaking new ground with the Virginia Marine Resources Commission, which manages oyster growing leases, when they asked about growing oysters in the Bay's open water.

Perry found his ideal spot by referring to the VMRC's online map of available oyster leasing sites while paddling his kayak around the Northern Neck, depth finder and salinity meter in hand. Taking aquaculture into "uncharted" waters has allowed him to avoid conflicts with shoreline homeowners and spread the water filtration benefits of oysters to new portions of the Bay.

White Stone was one of four oyster farms that The Nature Conservancy recently studied to better understand the potential water quality and ecosystem benefits of aquaculture. The report, conducted with the Virginia Institute of Marine Science, confirmed that oyster farming — in contrast with other forms of animal production that can generate water pollution — removes from the water up to 370 pounds of nitrogen and nearly 50 pounds of phosphorous from each mid-size farm per year.

Perry said the farm's unique location resonates with customers, but its success still comes down to whether the oysters taste good.

"We've gone up to countless chefs' back doors, just following the grease marks and knocking on the door," Perry said. "Most chefs are crazy busy, but they're open to trying an oyster any day."

PA power plant to stop coal ash pollution, pay $1 million fine

≈ Brunner Island plant near Harrisburg, long-criticized for pollution problems, will excavate landfill, stop leaks at 7 other sites

By Ad Crable

In a consent decree with four environmental groups, a large central Pennsylvania power plant has agreed to stop tainted water in its coal ash disposal sites from leaking into the Susquehanna River.

The Brunner Island Generating Station, located on the Susquehanna just south of Harrisburg, has agreed to close and excavate one of its active but leaking coal ash landfills and address leaks at seven other sites.

The plant also will be fined $1 million by the state Department of Environmental Protection, according to the consent decree filed July 31 in U.S. District Court in Harrisburg. The fine is the largest involving coal ash disposal in Pennsylvania.

The consent decree involves Brunner Island owner Talen Energy and the environmental groups Environmental Integrity Project, the Lower Susquehanna Riverkeeper Association, PennEnvironment and the Waterkeeper Alliance.

A consent decree is a legal agreement that solves a dispute between two parties without the accused party admitting guilt.

The Brunner Island Generating Station, located on the Susquehanna River in Pennsylvania, will be addressing leakage from several coal ash disposal sites that environmental groups allege is contaminating the river. (Dan Blood)

For 58 years, Brunner Island has burned coal to generate enough electricity to continuously power 1 million homes. Beginning in 2016, the plant began producing some power with natural gas. As part of another lawsuit and consent decree in 2018 with the Sierra Club, which had alleged air and water pollution, the plant is to phase out coal power by the end of 2028.

The legacy of toxic coal ash stored around the plant is the basis for the latest litigation. Coal ash includes fly ash and bottom ash left over from burning coal, boiler slag and flue gas materials.

The environmental groups contend that 367 acres of coal ash storage sites have leaked arsenic, boron, lithium, chlorine, phosphorus and suspended solids into the Susquehanna and two of its tributaries for at least the last five years — a problem they say threatens fish and aquatic species and puts kayakers, anglers, birdwatchers and local business owners at risk. The landfills cited as problems include six closed but unlined pits, one active unlined pit and one active lined pit.

The landfills are often saturated with water, and toxic material escapes through springs, seeps and overflows, according to the groups' lawsuit, which was filed simultaneously with the consent decree.

The groups criticized the state Department of Environmental Protection and the U.S. Environmental Protection Agency for not prosecuting Brunner Island and correcting the leaks, which they say violate the federal Clean Water Act and Pennsylvania's Clean Streams Law. The DEP renewed Brunner Island's discharge permit in 2018.

"We are pleased to have reached agreement and appreciate the hard work and collaborative efforts [of the various groups] to resolve this matter," Talen said in a statement.

"Talen is committed to complying with all environmental regulations and will continue to focus on the safe, efficient and reliable operation of our plants," said Talen spokesperson Debra Raggio.

Talen noted that it inherited the coal ash issues when it purchased the plant.

"The projects funded by this settlement will help ensure we are leaving the Lower Susquehanna River in better shape for future generations," said Ted Evgeniadis, the Lower Susquehanna Riverkeeper. "And those of us who enjoy the Lower Susquehanna River can rest easier tonight knowing that concrete measures and timelines are in place to reduce toxic pollution in the river."

Mary Greene of the Environmental Integrity Project said Talen Energy deserves credit "for stepping up to the plate and agreeing to measures that should significantly reduce pollution."

The Brunner Island plant has been long-criticized for generating air pollution, fined for fish kills and lambasted for closing fishing areas once open to the public.

Low salinity suspected for poor crab harvest in Upper Chesapeake

≈ Good news from winter survey is not a sure sign of the catch to come

By Timothy B. Wheeler

Crabs are netted from a trotline in Maryland's Little Choptank River. (2009 / Dave Harp)

At the beginning of July, media across Maryland delivered good news for those planning a traditional feast of Chesapeake Bay blue crabs on Independence Day.

Baltimore TV station WJZ, for instance, touted a new report that the Bay's crab population had increased 60% percent since 2018 — "meaning you can dig into 60% more crabs over Fourth of July weekend!" the station enthused.

"The survey is in," echoed WMAR, another Baltimore station, "and it comes with great news for Maryland crab lovers!"

Someone apparently forgot to tell the crabs, at least in the Upper Bay. While supplies were generally ample in the Lower Bay through spring into summer, crabbers in other places had a hard time finding enough of the crustaceans to satisfy their crab-craving customers.

"In 43 years of crab potting, this has been the worst I've seen," Charles County waterman Billy Rice complained shortly after the holiday weekend. Though his catch was starting to improve by mid-July, Rice, who crabs in the Potomac River, said the first half of the season had been so bad that he'd begun working fewer pots because there were so few crabs to be found in them.

The TV stations weren't reporting fake news. A winter survey by Maryland and Virginia scientists released in early May did find the Bay's crab population had soared 60% over the previous year — to an estimated 594 million crabs, the highest number since 2012.

But the strong growth in the Bay's crab population seen in the winter survey was no guarantee that there would be higher harvests everywhere in the Bay, and there weren't — at least not through the first half of the commercial crabbing season. The season runs March 17 through Nov. 30 in Virginia and April 1 through Dec. 15 in Maryland.

While Virginia watermen were said to be pulling in more crabs than last year, some Maryland watermen were left struggling during spring and summer holidays trying to explain to frustrated customers why they couldn't find the crab bounty that scientists had described.

The seeming disconnect between the survey results and the first half of the harvest season has reinforced some watermen's skepticism about the reliability of fisheries science. Others say the problem isn't with the survey, but in how the findings are portrayed to the public.

Maryland and Virginia have been running a winter survey since 1990, jointly dredging 1,500 sites around the Bay to see how many crabs they can find buried in the mud when cold weather renders them immobile. Experts consider the survey a highly reliable year-to-year gauge of the Chesapeake's crab population. Fisheries managers have used it to adjust crabbing regulations annually to ensure a sustainable harvest.

But the survey's findings are often treated by the news media as a forecast of the crabbing season just starting, and agency press releases at times have hyped results that way. In early July, for instance, an email to reporters from the Chesapeake Bay Program about a scientific status report on crabs carried a subject line stating "there's 60% more crabs to eat over the Fourth of July," even though the report itself didn't make such a prediction.

As a result, the public — and watermen — looked for a bountiful blue crab season that didn't play out the way they expected it to.

Fisheries scientists say the survey has generally been a reliable indicator of how that year's harvest will go. But finding a lot of crabs over the winter doesn't mean there'll be plenty when people want them, or that prices will drop. And sometimes, the survey and harvest diverge. In the 2017–18 survey, for example, scientists saw an 18% decline in overall abundance, but the Baywide commercial harvest in the summer of 2018 hit 55 million pounds, slightly better than 2017.

This year, said Genine McClair, the DNR crab program manager, "Considering what the survey said, we would expect to have a pretty decent year."

But she said there are a number of reasons why the harvest had been so spotty around the Bay through the first half of the season.

First of all, she noted, while the winter survey did find an abundance of crabs, 60% of them were juveniles — too small to be legally harvested until late this season or possibly next year, depending on how fast they grow.

The adult male crabs that were large enough to be harvested through the first half of the season are a "carry-over from last year," McClair said. Last year's survey found that the male population had decreased by 23%, so that, she suggested, could help explain lower early harvests.

Watermen in various parts of the Bay did report seeing large numbers of small crabs. But some in the Upper Bay and its rivers said they didn't see many of any size.

Some watermen also speculated that the record freshwater flows from last year's heavy rains may have driven crabs down the Bay, which might explain their scarcity in the northern half. McClair said that this year's survey found crabs more concentrated in the southern end of the Bay than in previous years when the overall abundance was similar in 2010 and 2012. But the distribution wasn't dramatically different than the year before.

McClair cautioned that the survey is like a snapshot. Once the water warmed and crabs got active, the unusually low salinity levels that persisted from spring through most of the summer could have prompted them to move elsewhere.

"Crabs can physically stay in low salinities," she said, "but they're not going to stay in that if there's nothing to eat." Adult male crabs tend to prefer salinity ranging from 3 to 15 parts per thousand, she said, but the levels in Maryland's tributaries were unusually low, stemming from the persistent rainfall the last two years.

Typically, early-season harvests are strongest down the Bay, where the water warms up sooner in the spring and crabs first begin moving about. Salinity levels there also tend to be higher.

J.C. Hudgins, president of the Virginia Waterman's Association, said crabbing started slowly for him — the crabs he'd seen in the winter while oystering up the Rappahannock River weren't there by spring. But his harvest picked up after he began potting a little farther south, nearer his home in Mathews. By mid-August, he figured his catch was running 20–25% ahead of last year.

"Everybody I know is pretty much doing better than last year," he said.

So much better, it would seem, that the market is glutted. Hudgins said

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that "we're getting really record low prices, lower than we've got in five or six years."

At the beginning of the season, he said, a waterman could get $120 per bushel for large male crabs, known as No. 1 Jimmies. The price had dropped to $70 in August, he said, and there aren't that many of them, at least in his part of the Bay. He said he'd made $30 a bushel in early August for some female crabs, typically sold to processors to pick for crab meat, but some watermen reported getting half to a third that much.

So, despite catching more crabs, Hudgins figured he's netted less money through mid-August because prices are so much lower.

Some Maryland crabbers also reported doing well the first half of the season, particularly from the Nanticoke River south along the Eastern Shore, according to McClair. Some watermen from farther up the Bay, where crabbing typically is slow in spring, journeyed south to take advantage of the reported abundance.

Talbot County waterman Jeff Harrison, meanwhile, said he'd had a "great year" so far crabbing in the Choptank River.

"We caught crabs right off," he said, noting that the mild winter had helped more adults survive the winter, "and the price was good." He also said he'd seen a lot of little crabs.

The catch wasn't nearly as good to the north, McClair said, where the DNR summer trawl survey found few crabs in the Chester River or in Eastern Bay.

Crabs were elusive along much of the Western Shore as well, at least early in the season.

Allison Colden, Maryland fisheries scientist for the Chesapeake Bay Foundation, said salinity appeared to be a major factor in the variability of the crab harvests from one place to another. But, she added, "I'm not convinced that's the only thing driving where they are."

A hard crab is measured to determine if it can be legally harvested in Tangier Sound. (Dave Harp)

The crab drought in the Potomac may be due to more than salinity, said the DNR's McClair. Surveys haven't found many crabs there for several years, she said, suggesting that may stem from the introduction of blue catfish, a large non-native predator that eats crabs as well as smaller fish.

In late July, Robert T. Brown, president of the Maryland Watermen's Association, said the overall harvest was "getting a little bit better" and that more small crabs were showing up in state waters.

Whether they'll grow to marketable size by late summer or fall depends on whether they survive and how quickly they grow. And that depends largely on food availability and water temperature, McClair said.

Rice said his harvest picked up a little in July, but even if it fully rebounds by fall, he doubts it will recoup the lost income from earlier in the season, because prices for crabs drop after the Fourth of July.

The surfeit of small crabs has prompted Dorchester County watermen to renew a longstanding campaign to get Maryland to relax a crabbing regulation that dictates a midseason increase in the minimum catchable size. Crabbers may keep any crabs at least 5 inches across until July 15, when the threshold goes up to 5.25 inches.

Dorchester watermen said the increase in minimum size forced them to throw back the bulk of the crabs they caught after mid-July. They want the DNR to consider delaying the size change by two weeks.

"We only ask for two weeks," said Dorchester crabber Bubby Powley. "With everybody in the Lower Bay [crabbing], it's killing us." He suggested the extension should be tried as an experiment.

Dorchester crabbers have tried without success for years to end or relax the minimum size increase. Their bid to ease the rule two years ago led to the Hogan administration firing Brenda Davis, the DNR's veteran crab manager at the time. Davis had told the Dorchester group that to prevent overharvesting they'd have to accept some other catch rule being tightened in exchange. They balked at the trade-off, and the rule remained, but Davis lost her job after the Dorchester group complained to Hogan.

Crabbers in other parts of the Bay have opposed relaxing the rule, with some raising economic concerns and others conservation issues. While Dorchester crabbers can sell smaller crabs to the picking houses that are their main market, other crabbers say they won't earn as much selling smaller animals for steaming.

And this year, at a late July meeting, a few members of the DNR's Tidal Fisheries Advisory Commission said they worried that the change could remove a greater share of male crabs from the Bay than scientists have said is sustainable, which might prompt regulators to impose catch limits on male crabs for the first time.

"You risk going over the trigger point," said crab retailer Gail Sindorf of the Kent Island Crab Co. in Pasadena. She called it a "dangerous" move.

The advisory commission voted in late July to urge the DNR to work with the crab industry on weighing "science-based management options" for the male crab fishery, specifically dealing with minimum size limits and possible changes to the season. Any proposed changes for next year would have to come back before the advisory commission.

Meanwhile, CBF's Colden said agencies might want to consider altering the way they report the winter dredge survey results. The news media have been conditioned to treat the survey as a prognosticator of harvest, she said, when it's not that simple.

Charles County waterman Billy Rice agreed.

"I think it would be great if they broke the details down and actually informed the public how things are," he said. "We're tired of people telling us 'I don't understand why you're not catching crabs.'"

Shad restoration efforts around the Bay a mixed bag in 2019

≈ PA hatchery releases smallest number of fish in history and spawning runs on James were worst ever, while MD and DE fared better and Potomac run set a record

By Karl Blankenship

These shad were caught on the Potomac River in 2009. The river maintains one of the healthiest stocks of shad on the East Coast. (Dave Harp)

A year ago, Pennsylvania's shad hatchery — the largest in the Chesapeake Bay watershed — was spared the budget-cutting ax. But it still took a toll on American shad stocking efforts on the Susquehanna River.

The state's Van Dyke Research Station released just 830,000 shad larvae into the Bay's largest tributary this year, the smallest number in the hatchery's 43-year history. Uncertainty over funding kept contracts from being completed for egg collections on the Potomac River, the largest source for the hatchery.

Instead, the hatchery had to rely on eggs collected at Conowingo Dam near the mouth of the Susquehanna, where production is always less than the Potomac.

Biologists from Maryland Department of Natural Resources and U.S. Fish and Wildlife Service donated some of the eggs they collected from the Potomac to help out. Otherwise, production would have fallen to 557,000.

"That definitely helped this year," said Josh Tryninewski, the Pennsylvania Fish and Boat Commission biologist who operates the hatchery.

The Van Dyke situation contributed to what was, overall, a mixed year for shad restoration efforts around the Bay.

While shad stocking fared better in Maryland and Delaware, the production loss in Pennsylvania accelerated a downward trend in shad stocking around the Bay. The effort peaked nearly 20 years ago when hatcheries were rearing and releasing 25 million shad or more a year into rivers from New York to Virginia. This year, fewer than 5 million shad will be stocked throughout the Bay region.

Shad spawning runs were the worst-ever on the James, and the number of shad passed by the fish lift at Conowingo Dam — 4,787 — was the lowest since it went into operation in 1997 and a fraction of its peak of 193,574 in 2001. Biologists said high river flows during the spawning run contributed to the poor performance.

But all of the news wasn't bad. The spawning run on the Potomac River racked up another record year, averaging 48.9 per net in surveys on the river, according to the Potomac River Fisheries Commission. The river maintains one of the healthiest stocks on the East Coast.

"The Potomac is amazing," said Chuck Stence, a biologist with the Maryland DNR who collects shad eggs on the river each year for the state's hatchery operation.

Monitoring by the Virginia Institute of Marine Science also showed shad spawning runs ticked up a bit on the York River, but runs were below recent levels on the Rappahannock.

Shad are an anadromous species, which means they spawn in freshwater rivers but spend most of their lives in the ocean until they return to their native river to reproduce, usually starting when they are around 5 years old.

They were once hugely abundant in the Chesapeake watershed, and their massive upstream migrations in the spring once supplied an important food source for native people and then colonists living far up the region's rivers. With habitat connections to both the Bay and its headwater areas, shad is a priority species for the state-federal Chesapeake Bay Program.

But decades of overfishing, pollution and dam construction have left the spawning runs from most rivers along the East Coast near historic lows. To help the fish rebound in the Bay region, states for decades have worked to improve fish passage, stocked millions of hatchery-reared shad and monitored annual spawning runs.

The largest of the hatchery operations was historically the Van Dyke facility on the Juniata River, a major tributary of the Susquehanna in Pennsylvania, which began operating in 1977. Its future was called into question last year when the state Fish and Boat Commission threatened to close it and two other hatcheries as part of a budget-cutting move. Although the commission is an independent agency, license fee increases have to be approved by the legislature, and they haven't risen since 2005.

The threatened cut angered lawmakers, and the commission's executive director, John Arway, ultimately resigned. Lawmakers said they would take up legislation to allow a fee increase, but that still hasn't happened.

Nonetheless, commission spokesman Mike Parker said the agency is "committed to keeping Van Dyke operations as normal." He said funding is in place to continue egg collection at Conowingo next year. And, he said, "we are still working on and optimistic that Potomac egg collection will be funded as well."

The Van Dyke hatchery alone once routinely churned out more than 10 million shad a year for stocking around the Susquehanna basin, though in more recent years its production has been in the 3 million to 4 million range.

Stocking efforts in Maryland and Delaware fared better this year.

In Maryland, DNR biologists stocked an above-average 2.4 million shad larvae and another 465,000 juveniles, 30-40 days old, into the Choptank, Stence said.

In Delaware, Johnny Moore, a fisheries biologist with the state's Department of Natural Resources and Environmental Control, said more than 800,000 larval shad were stocked in the Nanticoke — "well above our average" — and approached the record of just more than a million stocked in 2017.

The shad population on the Nanticoke remains "relatively low" despite stocking efforts launched in 2000, Moore said, but he added that "without our efforts, I think it would be a lot worse than it is right now."

Shad have proven difficult to recover in most rivers, and many biologists say efforts to rebuild the stock will likely take decades.

The problem, at least in part, is that shad produce far fewer eggs than many other species, such as striped bass, so it can be harder for them to bounce back when their populations are low.

Many of the Chesapeake region's rivers depend heavily on stocking to make up for that lost reproduction and maintain shad populations. On the James River, Patrick McGrath, a VIMS biologist who works on its annual shad survey, said their data suggest that the strength of the spawning run is closely tied to the number of hatchery fish released five or six years earlier.

That connection could bode poorly for the future, as Virginia last year stopped funding the U.S. Fish and Wildlife Service to rear shad for release in its rivers. Officials cited costs and concerns that many shad are being harvested as bycatch in the ocean by fisheries targeting other species, something that has been a concern of many shad biologists.

Chesapeake tributary flows free in wake of dam removal

≈ Spawning fish have already moved upstream after the removal of Bloede Dam on Maryland's Patapsco River

By Timothy B. Wheeler

Maryland's Bloede Dam is no more. Fish and people alike have wasted little time taking advantage of the newly liberated 8.4-mile stretch of the Patapsco River, which now flows unhindered for the first time in more than a century.

State and federal officials and the nonprofit American Rivers announced in August that the weather-challenged project to remove the 112-year-old dam is officially complete, and the riverside trail in Patapsco Valley State Park that had been closed for the demolition has reopened to a steady stream of hikers and bicyclists.

"The Patapsco River is free, after years of hard work by so many," said Serena McClain, river restoration director for American Rivers and manager of the dam removal project. "It's wonderful to see the Patapsco rushing back to life and to watch park visitors discover and enjoy the free-flowing river."

Built in 1906-07 to supply electricity to the nearby communities of Catonsville and Ellicott City, Bloede Dam stretched 230 feet across the river and stood 26.5 feet high. But it stopped generating power in 1924.

The dam continued to stop spawning fish and eels from getting more than 9 miles up the Patapsco, which flows roughly 38 miles around Baltimore's western outskirts before reaching the Chesapeake Bay. Moreover, it became a dangerous attraction for people — the Maryland Department of Natural Resources has tallied nine drowning deaths there since the 1980s.

Beginning more than a decade ago, pressure built to remove the dam. American Rivers joined the effort with state and federal agencies, including the DNR, U.S. Fish and Wildlife Service and National Oceanic and Atmospheric Administration.

Preliminary work on the dam's removal was disrupted by a catastrophic flood in May 2018. The actual demolition finally began in September but was dogged throughout the fall and winter by heavy rains. The job, which also required moving a major sanitary sewer line, proved a bit tougher and more expensive than originally planned, coming in at $900,000 over the original estimate of $17 million.

"Once we actually began excavating down to replace the Baltimore County sanitary line," McClain explained, "the volume of rock at the exact alignment we needed the pipe to be was significantly more than we anticipated."

Trees and shrubs were planted on the regraded riverbank where Bloede Dam once stood on the Patapsco River near Baltimore. (Timothy B. Wheeler)

Even so, she added, "I think everyone was generally pleased."

As part of the long-running campaign to free the Patapsco's flow, Bloede is the third large fish barrier to go. Union Dam upriver was taken out in 2010, followed by nearby Simkins Dam in 2011. Advocates say Bloede's removal restores a total of 65 miles of the river and its tributaries to spawning blueback herring, alewife, American shad and hickory shad, and more than 183 miles of habitat for American eels, though ecological conditions to support fish remain fair to poor in significant portions of the watershed.

> *Bloede's removal restores a total of 65 miles of the river and its tributaries to spawning blueback herring, alewife, American shad, hickory shad and American eels.*

Beyond a historical marker on the Grist Mill Trail near the dam's location, there's no sign or remnant left of Bloede. A pile of boulders on one bank marks where blasting took out one end of the dam. There are plans to install new interpretive signage.

"The site looks awesome, American Rivers' McClain said, "It's just amazing how it's changed."

The river flows clear this time of year. On a recent Saturday morning, a gaggle of resident Canada geese paddled around in its shallows, while two young men dove and swam in a bend where the channel deepens. The stretch where the dam once stood had to be cleared of trees so heavy equipment could get to the site and relocate the sewer line. The gently sloping rebuilt riverbank has been replanted with hundreds of saplings and shrubs.

"It looks different," acknowledged Ranger Joe Vogelpohl, assistant manager of the park.

The Grist Mill Trail, a portion of which had to be closed for the demolition, has also been rebuilt and was reopened in June. Hikers — solo, in pairs and groups, at times with leashed dogs — strolled by on a recent morning, occasionally stopping where the dam used to be. Others branched off into the woods on some of the 220 miles of trail that wend through the park, which covers 32 miles of the river's length.

Other trails are still being rebuilt after being washed out by the flash flood of May 27, 2018, Vogelpohl said.

Kayakers have already taken advantage of the dam's removal, though the American Whitewater website urges paddlers to "be careful" because the river is "constantly changing" as it adapts to its unimpeded flow.

Some fish also responded quickly. DNR staff conducting the Maryland Biological Stream Survey collected white perch and gizzard shad this spring more than 8 miles upriver just below Daniels Dam, the last major blockage on the Patapsco, said the DNR's Jim Thompson.

And at least a few river herring may have made their way upriver to Daniels Dam, according to Matthew Ogburn, an ecologist with the Smithsonian Environmental Research Center in Edgewater, MD.

Obgurn, who's been monitoring the Patapsco for spawning runs in recent years, said his research team this spring spotted what they thought were a couple of herring just upriver of the former site of Bloede Dam. They didn't catch them, though, so identification is unconfirmed. But they did find circumstantial evidence of herring making it upriver this year; water samples collected at four sites upstream of Bloede contained "environmental DNA," or genetic material, specific to herring, Ogburn said.

"It doesn't seem like they wasted any time at all," Ogburn said. His team is still analyzing all of their water samples to see if they can determine how many fish might have made it upriver and whether spawning actually took place. But he said the DNA detected so far is "pretty clear evidence" that herring "took their opportunity and cruised on upstream — at least some of them."

VA researcher wants to turn nest-building fish into rock stars

≈ Using their mouths, tiny male fish build elaborate stone structures to attract females

BY WHITNEY PIPKIN

Bluehead chubs are shown swimming over a nest one of the males had constructed. Other fish, called nest associates, congregate near these piles of rocks to also use them as spawning grounds or to eat the eggs. (Eugene Maurakis)

"Nest builder, nest builder, build me a nest," Eugene Maurakis hummed unselfconsciously, replacing the lyrics of a familiar *Fiddler on the Roof* tune with his own while arranging river-smoothed rocks into a neat mound on a dry path.

A stone's throw away, just under the surface of the Rapidan River in Virginia, a male bluehead chub had painstakingly constructed a heap just like this, called a nest, by moving dozens of rocks into place, one at a time, with his jaws. The mouth-made nests serve as spawning grounds and temporary homes to fertilized eggs and tiny larvae — and they are the inspiration for the name of a captivating category of fish species: nest builders.

These fish only exist in Eastern and Central North America and represent just 8% of minnows in the region. Out of 19 species of nest builders, seven live in the Chesapeake Bay watershed, dispersed among rock-bottomed streams connecting to rivers like the Rappahannock, James, Potomac and Susquehanna. Most of the nest builders are small, with males typically maxing out at 6–8 inches in length.

Virginia, with land that drains to both the Chesapeake and the Tennessee River, is home to nine nest-building species in all. The state has been the site for more than three decades of research by Maurakis, a professor at the University of Richmond and a retired chief scientist from the Science Museum of Virginia who can replicate each genus' intricate nest from blueprints in his mind.

His work will culminate in a documentary slated for release next year, a collaboration with the film and art departments from other universities.

"The only place these fish appear on Earth is right here in this part of America," Maurakis said. "When you think of it, there're 31,000 fish species and counting on Earth — and there's just a handful that do this."

All members of the *Cyprinidae* family of fish, these nest-builders include the bluehead chub, bull chub, river chub, creek chub, cutlips minnow and fallfish. Though there's some debate over the inclusion of a fish that pushes rather than picks up its rocks, the central stoneroller could also be considered a nest builder.

All of the active nest builders, excluding the stoneroller, have keratin — the protein that forms fingernails — on the inside of their mouths. The females and immature males do not build nests, so they do not have keratin, and the stoneroller has keratin on the outside of its chin and lower jaw instead.

"We hypothesize that it serves as protection, almost like a callus," Maurakis said.

Unlike the freshwater species with which most fishermen are familiar — such as the trout that flutter their fins and bodies to shape gravelly nests — these fish function as architects of their nurseries. Depending on the species, the fish can carry stones that range in size from pea-size pebbles to several centimeters across. Some males spend up to 36 hours fussing over their arrangements, sometimes swimming several meters away to gather just the right stone as the females wait and watch nearby.

In the end, the female decides whether to spawn with a male. Her decision could be based on his nest-making abilities, but researchers think is more likely based on his size.

"It's an interesting irony in terms of gender roles for human beings," said Scott Putnam, an associate professor in Virginia Commonwealth University's department of dance and choreography. He is working with Maurakis on the documentary, which will use choreographed routines as well as underwater video to portray the fish's intricate mating dance.

"We tend to think of pregnant women 'nesting,'" he said, but, with these fish, the males are "building a nest to welcome that connection. It's really quite lovely."

As romantic as the notion sounds, the fish are not monogamous. Though one male builds the nest, several males and females typically use it for spawning, and some species expand their mounds as they go until they reach up to two meters across.

Eugene Maurakis stands in a stretch of the Middle River in Madison County, VA, where small fish had built about a dozen rocky nests, like the one pictured in the foreground. Though many people think of the small fish as little more than bait, Maurakis wants to spread the word about the important work of the nest builders. (Whitney Pipkin)

While the relatively small fish might be hard to distinguish from others, their freshly constructed nests are easy to spot in the clear, shallow waters of a Virginia stream. Though they can be flattened by logs or swimmers, the mounds of rocks stand out for weeks after the spring spawn against an otherwise algae-covered substrate.

Maurakis was thumbing through his field notes, which record the 3,500 miles he's driven just in Virginia so far this year — between Bath County and Blacksburg — when his wife spotted unexpected movement in a nearby stream.

"You've got an active nest down here," said Penelope, a preschool teacher who sometimes joins her husband on research trips during the summer. "I just saw a fish with a rock in its mouth."

It was an early July day, weeks after spawning should have wrapped up in an unspoiled stretch of the Middle River in Madison County, but water temperatures had cooled enough to lengthen the season for some newly matured males. Sure enough, a bluehead chub was hovering around a freshly formed pile of rocks.

"Get out!" Maurakis said in disbelief, donning his hip waders and camera to get a better look.

In all, about a dozen nests were clearly visible — even to the untrained eye — from a bridge that crossed the river there. The bluehead chub, or *Nocomis leptocephalus*, is also relatively easy to spot, named for its stocky body and the distinctive hue of its head, which is covered in white tubercles that look like tiny horns — they also are

NEST CONTINUES ON PAGE 22

Neighborly approach to stream buffers has ripple effect among Amish

≈ Plain Sect watershed group earns community trust, aided by nongovernmental help for dam removal, fish habitat and stream bank stabilization projects

By Ad Crable

Each spring after the fertile fields have been planted in Lancaster County, PA, more than 400 Plain Sect children and their families gather on a restored section of Mill Creek, a stream that flows through an area with the highest concentration of dairy cows in Pennsylvania.

It's a wonderful display of community as the delighted youths pluck more than 400 recently stocked trout out of the water. The fishing derby and the togetherness it brings for neighbors linked by a stream also is the face of the Mill Creek Preservation Association, the only Plain Sect watershed group in the Chesapeake Bay watershed.

It's a small group. There's a core group of about six people and five of them are Amish. There are no members per se and no dues, though seasonal newsletters are mailed out to 440.

The group's tactics are simple, direct and effective: Its leaders walk down the lanes of their neighbors, point out the evident erosion problems in the stream and urge them to get their cows out of the water and give up a small part of their fields to allow, for free, restoration work.

The nonprofit has been doing this for 15 years with steady success. Only counting projects with assistance from the Lancaster County Conservation District, nearly 5.5 miles of Mill Creek have been restored, a stream that once had one of the highest concentrations of nutrients in Pennsylvania. The stream is one of the main tributaries to the Conestoga River, itself a degraded waterway heavy with nutrients that flows into the Susquehanna.

More than 6 miles of stream bank fencing have been erected to keep cows from lolling in the water, several low-head dams have been removed, 35 acres of streamside buffers have grown up and hundreds of bank stabilization and fish habitat structures were embedded within the stream.

These improvements would likely not have happened if a government agency or another private group had come knocking.

"The government would not have been able to come in and do this. Nobody would have opened up," said John Smucker, a local businessman and farmer who is the only non-Amish member of the group.

Though trends are changing, getting Plain Sect farmers to agree to give up pasture and accept government financial assistance has been a hard sell. The Chesapeake Bay cleanup has little motivational power, because few have ever laid eyes on it. And they tend to use every inch of available land for pasture or crops.

From left, John Smucker, Henry Esh and Henry Beiler are members of the nearly all-Amish Mill Creek Preservation Association. The men, shown here on a section of the Lancaster County, PA, stream they are helping to restore, is the only Plain Sect watershed group in the Chesapeake Bay watershed. (Ad Crable)

"The Plain Sect community can be somewhat isolated at times here," said Jeff Swinehart of the Lancaster Farmland Trust, which has worked with the association on outreach for its projects. "Here, it's their neighbors and family members and they see each other in church. They can develop that dialogue with their peers to really encourage them to make a change. It's a great demonstration of community conservation."

The group's movers and shakers are mostly farmers who themselves once allowed their cows to cool off in Mill Creek and gave little thought to what that meant for those downstream.

"Any more, we realize that the folks downstream are really affected by what I do," said 79-year-old Henry Beiler, a board member.

Fellow board member Henry Esh also came to see things very differently over time.

Mill Creek forms a wide S-curve through his pasture. Floods smashing against banks kept eroding his fields and the land around a bridge used to get farm equipment across the stream. "In my younger years, after two floods about a week apart, it was going to put this bridge in the middle of the creek. Dad came down here and said we've got to do something."

The association, with a grant from a natural gas pipeline company, contracted to have the stream narrowed while the steep banks were leveled so that floodwaters can overflow into the floodplain. Sediment is now filtered by a vegetative buffer.

Log structures placed in the stream bank deflect the force of high water and improve fish habitat. Esh dreams of catching trout in his section of the newly improved stream and has been taking water temperatures near spring-fed tributaries to see if the fish might survive hot summer water. His hopes rose when a recent stream survey of three restored farm properties turned up several trout nearby — likely escapees from the nearby fishing derby.

Asked if he had any complaints about the stream work on his farm, Esh laughed, "About the only bummer was last year we could not once go swimming because it never grew warm enough. At least it's much cleaner than it used to be. The farmland is filtered before it gets to the creek. That's one of the number ones."

Now, Esh is one of those walking down lanes and knocking on his neighbors' doors, asking them to do their part to make Mill Creek better.

Smucker, too, once thought nothing of letting his cows hang out in the stream on his farm. But he got to thinking. "A lot of us living down here just saw the eroding and devastation of the creek in its present form. We just began to talk about how we can fix this," he said.

He and several other concerned farmers held a meeting on an Amish farm in 2004 to gauge interest in forming a group to take action. The interest was there, though one farmer spoke up that it was his land and he had a God-given right to let his cows cool off in Mill Creek in July and August.

The group started slowly. Money for projects was routed through the Lancaster County Conservation District and a local chapter of the Izaak Walton League, an early supporter. The group American Rivers helped with a project to remove an old low-head dam that was blocking fish migration and damming silt.

As support grew, the association became an official nonprofit and started getting direct grants from government agencies impressed with work being done in places they had not made inroads. Restoration projects took place on the campus of a Mennonite high school and in community parks. More Amish farmers are seeing the differences on their neighbor's land. The annual fishing derbies are an educational tour de force.

"They galvanize the community," said Matt Koffroth, watershed specialist with the Lancaster County Conservation District. "They're the ones on the ground with these people 9 to 5. They're the ones knocking on the doors. It puts a local face on it and allows us and other agencies to go out and get things done."

Many concerns about government intrusion have faded away. The hardest thing often is to get farmers to give up more than 10 or 15 feet to plant filtering grasses and trees. Part of the challenge is that on small Amish farms, all available ground is needed to squeeze a living from the land. But there is also a long-entrenched feeling that overgrown land is unsightly and reflects poorly on a landowner.

"We meet so many farmers who say this looks hairy," noted Beiler, pointing to grasses waving in the wind on a restored stream section of Mill Creek. "To me this looks good."

About all that's holding the group back now is a need for more money. "We're just committed because we see how much good it's done," Smucker said. "We want to do more of it."

Lower milk prices, demand taking toll on region's dairy farmers

≈ Many, struggling to stay afloat, cannot afford to participate in conservation programs

By Ad Crable

For many dairy farmers in Chesapeake Bay states, the financial screws keep tightening.

While grain farmers can be hurt by disastrous years such as 2018 when water-soaked fields resulted in zero yields for some, they are backed by crop insurance programs that help get them through year-to-year market fluctuations.

But for dairy farmers, a decade of low milk prices brought on by oversupply and falling demand is taking a toll. Some ag lenders and those in the farm real estate business foresee a wave of banks shutting down credit for struggling dairy farmers this fall or winter, expediting a steady several-year stream of farmers leaving the business.

"What I'm seeing out there now is we're in uncharted waters with the dairy industry because some of these folks aren't sure where to turn to. Some of these farmers are in survival mode," said John Mattilio, who sells farms in central Pennsylvania with Farm and Land Realty. "I can walk onto a farm, and I can see the signs and symptoms of financial problems. These guys have a stack of bills on the kitchen table, and they're trying to figure out which ones to pay this month."

The face of dairy farms is already changing as proud farmers try to hang on to their land, which has often been in families for generations.

Some are renting out their fields so they can continue to live on the farm. Others are supplementing income by growing goats, produce, tobacco or raw milk and cheese. Some hope that growing hemp will save them. Others are selling timber or equipment to stay afloat, or add repair shops. Some have become truck drivers or have spouses going back to school to become teachers.

And some farmers are buying time by reorganizing under bankruptcy or refinancing, or jumping around between suppliers, maxing out credit for feed for their cows. They skip veterinary care for their animals and don't buy needed tractor parts or fix the barn roof.

And some are selling their dairy herds and equipment. "There are a number of empty barns around right now," noted Lowell Fry, vice president at Fulton Bank, the largest ag lender in Pennsylvania and a major lender in Maryland, Delaware and Virginia.

But it's an awful time to liquidate one's herd. So many cows are being sold that it's driven down the value, whether they are sold for meat or milk. The prices are so low that it's actually cheaper to buy cows or heifers for milk production than raising them on the farm.

Many times, especially with Plain Sects, neighbors band together and buy a few cows each.

Other dairy farmers are shutting down and selling everything. Each weekly issue of *Lancaster Farming*, a trade newspaper serving Bay states, lists a handful of farm auctions. But many also are sold privately to other farmers or family members.

Last year, Beiler-Campbell Realty, which sells farms in 30 Pennsylvania and northern Maryland counties, did a record $100 million in farm sales. By the end of June this year, their farm sales already totaled $68 million.

Many of the farms are being bought by other area farmers with larger operations instead of being sold to developers.

The Chesapeake Bay watershed is home to 571,000 dairy cows, according to the federal 2017 agricultural census. But that number is down 3% from the 2012 census.

Every Bay state that has significant milk production saw the number of cows decline. About two-thirds of the drop in cow numbers came from Pennsylvania — 20% in Lancaster County alone.

The financial stress on dairy farmers is having a chilling effect on efforts to enlist them for on-the-farm conservation practices. Even with cost-share projects, the farmer usually has to pay for some portion of the improvements.

"Many cost-share programs are reimbursements," noted Ryan Davis of the Alliance for the Chesapeake Bay. "A producer will likely to have to take out a loan to pay the upfront cost. This may be fine in a normal ag economy, but at this point, many farmers can't take on the additional debt."

"In good times, dairy farmers are usually stretched to come up with their contribution, but they do it," added Lamonte Garber of the Stroud Water Research Center. "With years of low prices for [milk], even modest projects are out of reach unless they're 100% funded, or nearly so."

To be sure, the seemingly endless tough times are taking an emotional toll. One agriculture writer in Pennsylvania knew three dairymen in three states who committed suicide in 2018. She knows others whose marriages have shattered.

The low milk prices that have prompted the current downsizing followed a relatively profitable period in the 1990s when many dairy farmers expanded their facilities and herds. Because land values for farmland remained high, farmers were able to borrow against that equity. But now, with millions invested in those expansions, there is no profit to pay off the investments.

Compounding the problem, feed prices in the Northeast are among the highest in the nation, further cutting into the chance for profits.

"These guys have ridden the wave longer than any other segment of agriculture. I think the people in the dairy industry never thought the economy would catch up with them like it has," Mattilio said.

But it has, and banks, though overall working patiently with their longtime customers, are required to deal with what they call "nonperforming" loans.

Many ag lenders said they now require farmers to draw up monthly budgets and report cash flows more frequently.

That's a positive thing, according to Mike Peachey, an accountant with Pennsylvania-based Acuity Ag Advisors, who works with dairy farmers. "You have to know what the future's going to look like, whether you're digging a hole, treading water or making progress."

But banks do not want to be in the

Farmers at a 2018 auction in Lancaster County, PA, bid on cows and milking equipment of an Amish dairy farmer reluctantly getting out of the business. The 28-year-old farmer instead took a job off the farm building sheds. (Ad Crable)

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Buffers from page 1

keep up with maintenance in the crucial first years after plantings. "It's been a problem really for the last 10 years," he said. "Everyone has known what we have to do, but we still haven't been able to crack this maintenance problem."

Buffer managers with other groups echo his lament.

"I'm sure anyone in this work has horror stories. It's a challenge," said Amber Ellis, senior watershed restoration manager for the James River Association in Richmond.

"We have had similar experiences," added Lydia Brinkley, the buffer coordinator for the Upper Susquehanna Coalition in New York and a small portion of Pennsylvania.

"I have seen many planting projects fail due to lack of maintenance and many plantings succeed due to diligence in implementing maintenance practices," said Craig Highfield, director of the Alliance's Chesapeake Forests program.

Concerns over failed buffers recently reached the halls of Congress. U.S. Sen. Bob Casey of Pennsylvania successfully added related amendments to the 2018 Farm Bill. In addition to increasing money to expand forested riparian buffers in Bay states, money would be allotted to groups and government agencies to do "burdensome" maintenance on behalf of landowners.

"Planting the tree is the easiest part. Getting the tree to survive the first 5 years is the hardest part," said Lamonte Garber, watershed restoration coordinator for the Stroud Water Research Center, whose studies into more effective techniques for establishing buffers have become industry standards.

"Awareness and understanding in science around this issue has definitely evolved and improved, so we're in a much better place than we were 20 years ago," Garber maintained. "That said, there are plenty of projects that go in that there's not a solid plan for establishment, and those buffers can go off the rails very quickly."

The problem was highlighted in recent years as Bay states reported nutrient reductions from buffers, claiming credit toward meeting their cleanup goals. But when managers went out to inspect and verify the buffers, an unsettling number had languished.

Why?

In many cases where buffers fail or replantings have to be done, it's a matter of the landowner not following through.

The largest-scale buffer program in the Bay watershed is the federal Conservation Reserve Enhancement Program.

Ryan Davis of the Alliance for the Chesapeake Bay inspects the status of a tree growing in a tube shelter on a riparian buffer near Lititz, PA. The buffer is mowed regularly but invasive canary grass quickly grows waist-high between mowings and would swarm plantings without maintenance. (Ad Crable)

CREP, as it is known, provides an annual payment to landowners, usually farmers, who agree to take land along rivers and streams out of production in order to plant forested or grassy buffers.

That fee is supposed to cover maintenance and protection of the buffer for as long as it takes to get established. But, too often, environmental groups say, the needed information and technical guidance is not communicated to the landowner and buffers fall into disrepair.

It's tempting to bash the landowner who is taking taxpayer money, but Ellis said the problem is not clear-cut. "Especially for landowners who have a pile of other work or a full-time job," she said. "If they are an active farmer, they're working who knows how many hours a week. Maintaining a buffer is just another thing."

A tree planted in a tube shelter for a riparian buffer makes contact with a net designed to keep birds out of tubes. If the netting is not removed, trees can get tangled and start to grow downward. (Ad Crable)

Holly May, who works on establishing forested buffers for the Alliance for the Chesapeake Bay in West Virginia, said "With at least CREP, the maintenance payments just aren't enough to motivate [landowners] to make them do it. If they're looking out the window and see the buffer, they will do it, but if it's out of sight and out of mind, it's a little easier for time to get away from you."

The burden is on landowners, say federal officials who administer CREP.

Part of the annual payment is for maintenance, said Alexis Tirado, the federal Farm Service Agency's program manager for CREP in Pennsylvania. "It's your responsibility. You committed to that when you signed the contract. You don't enroll in the program and forget about the land you just enrolled. But for multiple reasons, not everyone understands it in that way," Tirado said.

But once a landowner sends notification that the buffer is complete, the regulations only require that someone from the federal Natural Resources Conservation Service check the buffer for compliance once within five years.

Tirado emphasized that every county office of NRCS operates differently and more frequent monitoring may happen. "It depends on workload," he said. "That's one of the main limiting factors."

Certainly, Roger Rohrer, a poultry farmer in Lancaster County, PA, had no idea what he was signing up for when he agreed to a CREP buffer along a stream in 2001. At that time, CREP did not even allow landowners to mow or use herbicides on a buffer.

That, along with two droughts, caused about 750 planted trees to fail, he said. "Tubes were swallowed by invasives. It was an eyesore and a bad billboard for the whole concept."

Still, after learning about the environmental benefits of buffers and the effects that stormwater runoff from Lancaster County was having on the Bay, Rohrer signed up for another buffer on his land in 2010 and a third in 2016.

Spraying and mowing was now allowed. He learned by doing. He discovered the hard way how to fix dislodged tubes after storms.

"Nobody knew about the maintenance but we figured it out as we went," he said. "That one– to seven-year period is critical, and there's a lot of work to be done. I'm not sure the industry understands that. In my 18 years of buffers, I'm in there every week with a spot sprayer controlling invasives… I tell farmers who come to look at my buffers that it's like a seven-year crop and you have to stay with it."

Some environmental groups are taking matters into their own hands, and state and federal agencies are meting out more money to bolster maintenance, or "establishment" as it's called by managers.

In Pennsylvania, Davis related an experience that he called a "wake-up call." Three new buffers subsidized by the state were planted in the spring of 2018 to launch a new streamside buffer program. Even though the program includes maintenance provided by the Alliance, when the sites were checked again in late summer, record wet weather had killed trees. Floodwaters and debris had knocked over tubes and shorted out an electric fence, allowing cows to run roughshod over the plantings.

Davis put out the word to a network of volunteers and quickly assembled a Riparian Ranger program. The volunteer "rangers" pledge to go out once a month during the growing season to check for fallen tubes, ensure that mowing and spraying have been done and look for dead trees or shrubs.

Already, Riparian Rangers have signed up for all 30 sites established in three Pennsylvania counties. Many are

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Master Naturalists, Master Gardeners and others wanting to make a difference.

A Pennsylvania nonprofit, the ClearWater Conservancy, has initiated a similar program in which volunteer Habitat Stewards perform maintenance on existing buffers.

In Virginia, the James River Association, in partnership with the state Department of Forestry, started a new riparian buffer program in which maintenance is built in for three years. The Department of Forestry also sends foresters out to each CREP buffer project until it is deemed established.

In both Maryland and Virginia, the Alliance for the Chesapeake Bay has started a Healthy Streams Farm Stewardship program in which landowners who engage in buffer projects are handed financial vouchers they can use for maintenance needs. In Virginia, buffer programs through the Alliance also come with maintenance provided.

In a New York pilot program, supported by federal funding from the National Fish and Wildlife Foundation, the Upper Susquehanna Coalition is performing maintenance work on buffers, no matter who started them.

Such new and needed emphasis on helping new buffers to ward off the many threats they encounter comes at a time when Bay states are pushing for even more buffers. The state-federal Chesapeake Bay Program has a goal of adding buffers to 900 miles of streams each year, though the totals have nowhere approached that goal in recent years.

Buffers have been a tool in the Bay restoration since 1994. They continue to play an important role in the draft Bay cleanup plans that Bay states and the District of Columbia submitted to the U.S. Environmental Protection Agency in April.

Pennsylvania is calling for $41 million to be spent on forested buffers and another $9 million on grass buffers by 2025.

Virginia is trying to boost flatlined buffer plantings by increasing the state match for CREP projects. The state wants to double its acreage of grass buffers over the next six years and substantially boost forested buffers.

Maryland also wants to increase the rate of plantings for forested and grass buffers.

In New York, state environmental officials want to double both the amount of forested and grass buffers by 2025.

West Virginia, even though it has already met its cleanup goals, also has streambank restoration as a priority action.

Much of those lofty goals will depend on buffer maintenance.

This is Davis' plea: "Just give us three or four years of tender, loving care, mowing and spraying a couple times a year, and it'll last for 300 years."

Lack of maintenance on this buffer project has allowed invasive Japanese hops to gain a stranglehold on a tube shelter. (Ad Crable)

A young tree grows in a biodegradable tube shelter on a riparian buffer project in Lancaster County, PA. An herbicide has been sprayed in a circle around the base of the tube to allow sunlight to reach under the tube and to keep tree-girdling rodents at bay. (Ad Crable)

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real estate business. And they fear that a mass exit from farming would drive down farm values and make it difficult to recover their investments.

"Banks will take steps so there is not a mushroom exodus. We get hurt, too, if all farmers sell at once," said Fulton Bank's Fry. "I don't think that we're going to see a mushroom cloud of this because everybody is working so hard. But we're not extending credit."

Added Dale Hershey, an ag lender with Univest Bank & Trust, which serves Pennsylvania, "Anytime you get an oversupply [of milk], sooner or later something had to happen. But, man, this has been a long drawn-out process. This trough has been deeper than we've ever seen. It just keeps on lingering and lingering."

Where will it end?

Some dairy farmers are embracing several months of a slight uptick in milk prices as hope that, just maybe, better times are around the corner.

But few in the financial side of the industry share that optimism.

Fry sees reductions in the numbers of dairy farms in Bay states continuing to dwindle. "I think the industry will figure out how it will work," he said. "They will find a way to increase cash flow to a point that they can manage that and move on."

Mattilio agreed. "They're going to have to be creative. They're hard-working and creative. But some of them will have to realize what we did no longer makes sense," he said.

Mattilio, who grew up on a dairy farm and spent 14 years as an ag lender, predicts two trends. In one, dairy farms will be bought by larger operations, meaning fewer but larger farms of 500 cows or more. Existing farms that survive will be smaller ones that can be run by a family without outside labor. That's especially the case with Plain Sect farms.

"What we know to be true and reasonable in the dairy industry is gone," he said. "The situation is dire and folks who think it is going to come back around… These dairy farmers are not used to failing. They're not used to not being able to pay the bills. I don't know where it's going to take us, but it's going to be different."

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called "horny heads."

"It blows my mind when we come to a stream and he can identify basically anything that we see," Penelope said. "Unless they have a giant blue head, I don't know what it is."

Maurakis and his collaborators, including Emmanuel Frimpong, an associate professor of fish and wildlife conservation at Virginia Tech University, hope to get more people hooked on these fish that many know so little about. Because most nest builders are no more than 8 inches long, the general public thinks of them as little more than bait.

"People say, 'Oh, it's just minnows. I fish for bass,'" Maurakis said. "But we're hypothesizing that — once they understand that there are these gorgeous, fascinating fish in this stream by this park over there — that they'll begin to consider changing their behavior."

When people throw old tires or oil into a backwoods waterway, Maurakis said, they don't realize that it could impact the entire ecosystem that supports these fish.

Maurakis, who lives in Midlothian, knows firsthand that pollution continues to threaten these fish that thrive in cool, pristine waters. He once found a pool of dead fish in a stream near his house that was later traced to someone draining their chlorine-rich swimming pool into the nearest waterway.

Nest builders, like many other freshwater fish in suburban and rural areas, are sensitive to a suite of pollutants, whether they wash off fertilized lawns or farm fields. More than 700 of the 1,200 species of freshwater fish in North America are considered imperiled by the American Fisheries Society, meaning they are vulnerable to becoming endangered or extinct. Of those, 25% are minnows and chubs, a group that includes nest builders.

After studying these fish for more than 30 years and writing, with colleagues, some 35 peer-reviewed studies about the creatures, Maurakis now wants to better understand what people know about them and what they don't. A press release announcing a grant Maurakis received from the Virginia Academy of Science to carry out this new phase of research stated that people today are more likely to know about wildlife in Africa than about environments in which they live.

That's something he'd like to see change, and he thinks the nest builders will make good torch bearers for the cause. After tagging along for a few nest-spotting trips this summer, his wife has become the most recent convert.

"I feel a certain sense of excitement when I go to a stream and see that pile of rocks," Penelope said. "It kind of gives me hope to see that, with so much pollution going on in some areas, there are still some pristine streams around that are full of life."

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before the weather turned unusually wet in July, resulting in record-setting rain for much of the watershed.

Rainfall scours sediment off the landscape along with nutrients that spur algae blooms. Carried into rivers and downstream to the Bay, the sediment and algae blooms blot out the sunlight essential for aquatic plants to survive.

The unrelenting rain and ensuing muddy water prevented the aerial survey from being completed. But the 78% of the Chesapeake where images were gathered contained 91,559 acres of underwater grasses. Had the survey been completed, scientists believe total acreage might have topped 108,000 acres.

"I think we would have been well on our way to surpassing the 2017 levels if the last year hadn't turned into such a muddy mess," said Brooke Landry, a biologist with the Maryland Department of Natural Resources and chair of the state-federal Bay Program's Submerged Aquatic Vegetation Workgroup.

The Bay restoration goal is 185,000 acres.

The strongest increases last year were in the mid– and high-salinity regions of the Bay. Those areas showed significant increases, mainly because of the expansion of widgeon grass, which showed up in some areas where it had never been previously reported.

"Baywide, the story [was] really the huge expansion we've had in widgeon grass," said Dave Wilcox, a VIMS scientist who works on the survey. "That's what is driving our numbers in the last several years."

Widgeon grass is the most abundant underwater grass species in the Bay, but it is notorious for being a boom-and-bust species that can quickly disappear when water quality declines.

And, Orth said, this year's survey is showing that many of the widgeon grass-dominated areas of the Mid Bay and some areas of the Lower Bay appear to have suffered significant losses, which likely means overall Bay acreage will be down sharply when this year's survey is completed.

Places like the Honga River and around Smith and Tangier islands had "luxuriant beds" in 2018, Orth said, "but it's a different story this year."

Also, poor conditions and warm water also appear to have taken a toll on eelgrass beds in the Lower Bay, Orth said. "The numbers, I hate to say, I think are going to be really low in those areas," he said.

But the news isn't bad everywhere. Farther up the Bay, freshwater species of grasses are doing well in many places this year, including the Choptank, Chester, Severn and Magothy rivers, some of which have more underwater beds this year than they did in 2018, Orth said.

Widgeon grass floats on the surface at low tide on the Honga River in Dorchester County, MD. Hoopers Island is in the background. (Dave Harp)

"Everyone was concerned about turbidity from this vast amount of freshwater that we had last year, but it seems to have had a positive impact on the freshwater plants, and they seem to be not nearly as affected by the turbid water as the Lower Bay plants," Orth said.

Many of the freshwater grass species form canopies that reach to the water surface which may have helped to protect them from the murky conditions, he said.

Images show the large bed at Susquehanna Flats, near the mouth of the Bay's largest tributary, appears to have survived largely intact even though it was subjected to months of high river flows and muddy water.

"It's resilience at work," Landry said. "We had gotten to a point where we had a lot of nice, dense grass beds, and we put them through the wringer last year. I think we'll see some loss this summer, but it appears as though we have gotten them to some point of resilience where they do withstand more stress."

Indeed, satellite images from last fall showed that muddy water pouring out of the Susquehanna was not penetrating to the interior of the Susquehanna Flats grass bed. Instead, the dense grass growth was shunting chocolate brown water to either side of the bed.

Still, the final analysis will likely show the high flows diminished the bed somewhat. Cassie Gurbisz, a biologist from St. Mary's College of Maryland who has been studying Susquehanna Flats for years, visited a number of sites in early August. While all continued to have grasses, she said many seemed patchier than they did before last year's high flows, but her analysis was still under way.

A major concern involves the fate of eelgrass, at the opposite end of the Bay.

Eelgrass is the dominant underwater grass found in high-salinity areas. Last year's survey found robust beds in the Lower Bay, but hot temperatures last summer — possibly compounded by an influx of low-salinity water — caused mass defoliation later in the fall. Orth said it appears that high temperatures this year are taking a toll again.

"It's a concern, and part of the climate change scenario," he said. That could leave large areas of the Lower Bay, where beds are especially important for juvenile crabs, denuded of vegetation.

The need to restore underwater grass habitat is one reason that the Bay cleanup effort aims to reduce nutrient and sediment pollution, as water clouded by sediment or nutrient-fueled algae blooms can be lethal. Like all green plants, submerged grassed need sunlight to survive.

Grass beds are also a critical component of the Bay ecosystem in their own right. In addition to providing food for waterfowl and shelter for fish and crabs, they pump oxygen into the water, trap sediment and buffer shorelines from the erosive impact of waves.

Freshwater flows into Bay continue to run higher than normal

≈ Pollution entering Chesapeake worsened water quality and led to a large 'dead zone'

By Karl Blankenship

The unusually protracted string of higher than normal river flows into the Chesapeake Bay has continued well into this year, according to figures from the U.S. Geological Survey.

Altogether, freshwater river flows into the Bay were higher than normal for 13 out of the 15 months from May 2018 through July, according to USGS data, including five of the first seven months of this year.

The pollution carried into the Bay during that span has led to worse than normal water quality and triggered a large oxygen-starved "dead zone" in the Bay.

In July, the USGS reported that the estimated cumulative flow into the Bay from its nine largest rivers — which account for more than 95% of the freshwater entering the Bay — averaged 54,000 cubic feet per second. That was the 15th highest flow on record for the month since the agency began tracking river flows into the Bay in 1936.

The USGS considers a flow to be above normal if it is among the top 25% for a given month.

High freshwater flows are typically bad news for Bay water quality because they carry large amounts of water-fouling nutrients and sediments, which are flushed off the landscape and into the Chesapeake.

In the Bay, nutrients fuel algae blooms that cloud the water. As the blooms die and decompose, they are consumed by bacteria in a process that depletes water of oxygen. Sediment also clouds the water and smothers bottom habitats.

Earlier this year, scientists predicted that the huge influx of nutrients would lead to a greatly expanded dead zone. In July, the Maryland Department of Natural Resources confirmed that the area of low oxygen, or hypoxic, water was significantly worse than average.

In early July, the DNR reported a dead zone of 1.92 cubic miles in the Maryland portion of the Bay, compared with an average of 1.36 cubic miles. In late July, scientists found 2.01 cubic miles of low-oxygen water, compared with the late July average of 1.34 cubic miles.

Along with pollution, high flows added a surge of freshwater to the Bay that kept salinity low near the surface, causing strong stratification between the surface and higher-salinity bottom waters. That made oxygen conditions worse by essentially trapping oxygen-starved water on the bottom and preventing it from mixing with the oxygen-rich surface water.

DNR scientists said conditions were also aggravated by temperatures that warmed Bay waters to nearly 90 degrees. Warmer water holds less oxygen than cool water.

The flow data is found on the recently updated USGS Chesapeake Bay website, usgs.gov/centers/cba.

The DNR's hypoxia reports are found at dnr.maryland.gov/waters/bay/Pages/Hypoxia-Reports.aspx

Paddle through past landscapes along remote Cat Point Creek

From a launch site onto Menokin Bay in Virginia, paddlers can explore Cat Point Creek's protected upstream reaches or head downstream toward the Rappahannock River.

By Leslie Middleton
Photos by Dave Harp

Early morning light beckoned me upstream into the green, marshy world of Cat Point Creek, a tributary of Virginia's Rappahannock River.

I paddled the creek's narrow path through pastures of arrow arum, past tight fists of yellow pond lilies that had begun their spring unfurling. Blue flag irises were emerging from ferns that had found a toehold in boggy soil amongst the roots of a small, red maple.

The rhythmic swirl of water eddied off the paddles, occasionally interrupted by sounds from the marsh: The slap of a beaver marking its territory before sliding, unseen, beneath the flatwater to the tangled woodwork of its den. The cry of a pileated woodpecker on its trajectory through the creek's forested valley.

Cat Point Creek offered such a complete feeling of remoteness that I felt I must be close to experiencing the land — and waterway — much as it had been before English settlers came to the area.

I'd set off that morning from a launch downstream at the historic site of Menokin, the 1769 home of Francis Lightfoot Lee, who signed the Declaration of Independence. The grounds include a recently improved launch site for canoes and kayaks. My paddling companion was Alice French, the Menokin Foundation's educator, whose job includes taking visitors onto Cat Point Creek from spring to fall.

Menokin offers the only public boat launch on Cat Point Creek, so paddlers are often found heading down the hill behind the remains of the Lee family's house, now undergoing restoration to showcase Colonial building methods. The road descends through towering tulip trees that date to the early 1800s.

The launch site itself was once the plantation's bustling wharf at the end of a "rolling road," where large casks of tobacco were rolled downhill to waiting ships. The road is still evident as a deep depression alongside the path to the launch site.

Cat Point Creek stretches 19 sinuous miles, roughly north to south, across almost the entire width of Virginia's Northern Neck. And although the creek is a Rappahannock tributary, its headwaters are just a half-mile shy of the Potomac River.

A satellite image of this portion of "the Neck" shows the dendritic tendrils of Cat Point and other creeks that empty into the Rappahannock. They cut into sediment laid down eons ago, giving way to modest escarpments above which Native Americans and then colonists established settlements. Now covered in forest, they flank either side of Cat Point Creek at the far edges of the wide, watery valley.

As we paddled upstream from Menokin Bay, the creek was narrow and boggy. Here and there, a thin white PVC pipe marked possible channels, but at times the waterway got so narrow we were forced to back out and try another route.

I'd been told that during the high tide — *and* after a lot of rain — we might be able to paddle another 5 miles upstream if we were willing to navigate downed trees and an uncertain pathway through dense wetlands. That kind of adventure would have to wait for another day.

After a slow mile upstream, stopping to admire the blooms of Virginia sweetspire and the delicate evening primrose, we headed back to Menokin Bay. It was only on the return trip that I saw a single house in the distance.

I wanted to see the downstream stretch of the creek, too, as it winds its way to the Rappahannock. On a different day, after setting up a return shuttle, I launched from Menokin during a slight drizzle.

The creek's serpentine curves became more obvious as I paddled. Each was bounded by solid, tree-covered banks pockmarked by dark holes where kingfishers and other animals burrowed.

Scraggy roots of mountain azalea clung to the bare soil of these north-facing cliffs, refuge pockets for plants more commonly found in Virginia's higher elevations. Every so often, a large splash roiled the water nearby, possibly a blue catfish or gar. An immature bald eagle followed us downriver, stopping on tree snags along the way.

The freshwater marshes of Cat Point Creek, a tributary of the Rappahannock River in Virginia, offer perfect habitat for largemouth bass, crappie, rockfish and catfish.

Long before Cat Point Creek became one of several designated "water trails" on Virginia's Northern Neck, it was for eons one of many watery pathways integral to the lives of the local indigenous peoples. In 1608, Capt. John Smith recorded 14 Rappahannock Indian settlements on the north side of the river and its tributaries. The lands surrounding Cat Point Creek offered superior soils for small-scale agriculture and pottery making.

These same rich soils and elevated plateaus were attractive to English settlers, too. By the late 1600s, the Rappahannock had been mostly displaced from their homeland.

The Menokin plantation was not the only large farm along Cat Point Creek during the colonial era. Just downstream from Menokin is Mt. Airy, owned by the Tayloe family for more than 250 years. Tenth generation Tayloe Emery lives there today with his wife and two children, who are growing up, like their forebears, with a close relationship to the creek.

"We have some old letters between John Tayloe and George Washington, talking about duck hunting," Emery told me. "I like to think of the creek as where George Washington used to shoot his dinner."

Emery has a conservation easement on much of his property, ensuring protection into perpetuity.

In all, more than 10% of the 48,000 acres of the creek's watershed is protected by easements. The Tayloe Tract, close to the mouth of the creek, was the U.S. Fish & Wildlife Service's first acquisition of the Rappahannock River Valley National Wildlife Refuge.

Today, the agency manages several parcels along the creek set aside for wetlands, water quality, wildlife and especially waterfowl. Headed down the creek toward the river, we passed multiple duck blinds perched on the edge of the creek.

After several days of rain, the creek's downstream flow matched the tidal current headed upstream, and the wind was thankfully behind us. There was no one else on the water — not unusual, according to those who frequent the creek. But we continued to be followed by a mature bald eagle, who was joined from time to time by an immature eagle.

Bill Portlock, senior educator for the Chesapeake Bay Foundation, has paddled here in every season for many years, often as part of the annual winter bald eagle survey conducted by the College of William and Mary. It's not uncommon, he said, to find eagles there in large numbers.

"There are eagles perched on the edges of the marsh everywhere — so many that we often have to stop the boat to make an accurate count," he said.

Above: A kayaker enjoys a serene paddle on Cat Point Creek in Virginia through the early morning mist. Right: A delicate web weaves through bare branches along the creek's shore. More than 10% of the its watershed is protected by public and private conservation easements — many adjacent to the creek itself — that help protect water quality and wildlife into the future.

Portlock attributes this to the wide variety of life found in the creek's ecosystem and said the diversity is driven in part by its location.

"Cat Point Creek is located right at the cusp where the salt wedge coming up the Rappahannock from the Chesapeake Bay runs under the fresh water coming downstream," he explained. The upwelling is the source of biological productivity in the river and the creek.

Richard Moncure, tidal river steward for Friends of the Rappahannock, has spent much of his life on the Rappahannock and often leads educational trips on Cat Point Creek.

"The creek is like a microcosm of the entire Rappahannock River: brackish at its mouth, becoming fresher the farther upstream you go. It's a great place for teaching about watersheds, and it's still relatively pristine," he said.

And, according to Moncure, it is "perfectly underutilized."

The stretch of the creek from Menokin Bay south to the Rappahannock River is crossed by two low bridges, limiting power boat traffic to those well-timed to the tides. "It's ideal for kayaks and other small watercraft," he said.

The wind picked up as we paddled under Newland Road, the second of these bridges, right as Cat Point Creek widens onto the river. It took some work to paddle upriver to our take-out at Naylor's Beach Campground. The Rappahannock is a couple of miles wide here, and I missed the intimacy of the creek's marshy, serpentine channel.

Another day — another season — I'll return. Maybe in the late summer, when the arrow arum's dark sticky seeds are forming the winter food for ducks, or in the fall, when the wild rice lets loose on the water. Maybe next spring, as the green of the freshwater marsh is just emerging.

No matter when, I'm reasonably confident this unique and highly protected landscape will have changed little.

Bill Crouch, assistant manager for the Rappahannock River Valley refuge, puts it this way: "Cat Point Creek comes very close to the character of wilderness that so many of us seek … untrammeled, and mostly unaltered by man."

The paddle launch and kayak rentals are available at Menokin during daylight hours. Visit menokin.org or call 804-333-1776.

For a digital map of the water trails on the Northern Neck of Virginia, including Cat Point Creek, visit virginiawatertrails.org.

Ponder history, explore trails at Maryland's Fort Frederick

Built near a bend in the Potomac River in 1756–58, under the watchful eye of Maryland's colonial governor, Horatio Sharpe, Fort Frederick conforms to a design developed in the early 1700s by French military engineer Sebastien de Vauban.

By T. F. Sayles
Photos by Dave Harp

I have formed three distinctly different impressions of Fort Frederick, the 1756 stone fort that is now the centerpiece of a 585-acre state park in Western Maryland.

There's the Market Fair experience every year in late April, when acres and acres of white tents sprout in the fields around the fort and literally thousands of people — easily half of them dressed for the 1700s — spend four days buying and selling all manner of Colonial era products and demonstrating those ways of life.

Then there's the spartan, Colonial-frontier feel inside the fort, where I can easily imagine how safe it must have felt to an English settler inside those massive, 18-foot-high walls during the French and Indian War, which included more than a few civilian casualties.

And finally, there's down the slope of the fort grounds into the woodsy Potomac River bottomland and what feels like the very bosom of nature. Here you'll find the C&O Canal trail and the narrow strip of thin, second-growth forest that the former towpath runs through, skirting the south edge of Fort Frederick State Park for a mile or so. Big Pool, a long narrow lake, parallels the river. In the canal's heyday, the pool served as both a turning basin and a semi-natural mile-and-a-half of the canal itself.

On a spring visit, I also found carpets of bluebells and the perfect, ineffable green of mayapple and wild ginger as well as brand-new river birch leaves. It was lush and green, so I struck out on the towpath, upriver. I made a pretty good jaunt of it, nearly 2 miles, past the upper end of Big Pool. There I came to a low steel railroad bridge, carrying what appeared to be active tracks over the towpath and then, my iPhone map revealed, over the Potomac River into West Virginia.

Resting on a patch of grass near the steel bridge, I struck up a conversation with a pair of hikers who were also taking a breather — outdoorsy 30-something women and three beautiful, happy, goofy Labradoodles named Moe, Larry and Curly (The Three Stooges live on!). From nearby Shepherdstown, WV, and regulars on the area's trails, they told me that if I had instead headed downriver from Fort Frederick, I'd have found a much quieter stretch of the towpath. "Quieter how?" I asked. And then, as if on cue, a tractor-trailer's engine brake burped rudely though the woods — no doubt from Interstate 70, just a quarter-mile away.

"Quieter than that," said one of the women, nodding toward the sound. "If you go the other way from the fort, the highway gets farther away."

I filed away that intel for further investigation, perhaps in the afternoon or perhaps on another day.

Back at the fort grounds, the 25th annual Market Fair was under way and bustling. White tents sprawled for acres, some of them large framed affairs holding rows of display tables, mixed with more modest setups and simple lean-tos or blankets on the ground. And all were open for business, selling Colonial wares and trinkets and products of every imagining. There were tri-corner hats, coonskin caps, buckskin clothing, handmade pottery, miniature wooden muskets, actual muskets, powder horns, wrought-iron hardware, native crafts, period maps, silver steins, copper pots, iron skillets, petticoats and bodices and bonnets, shoes and boots and stockings, and even animal pelts.

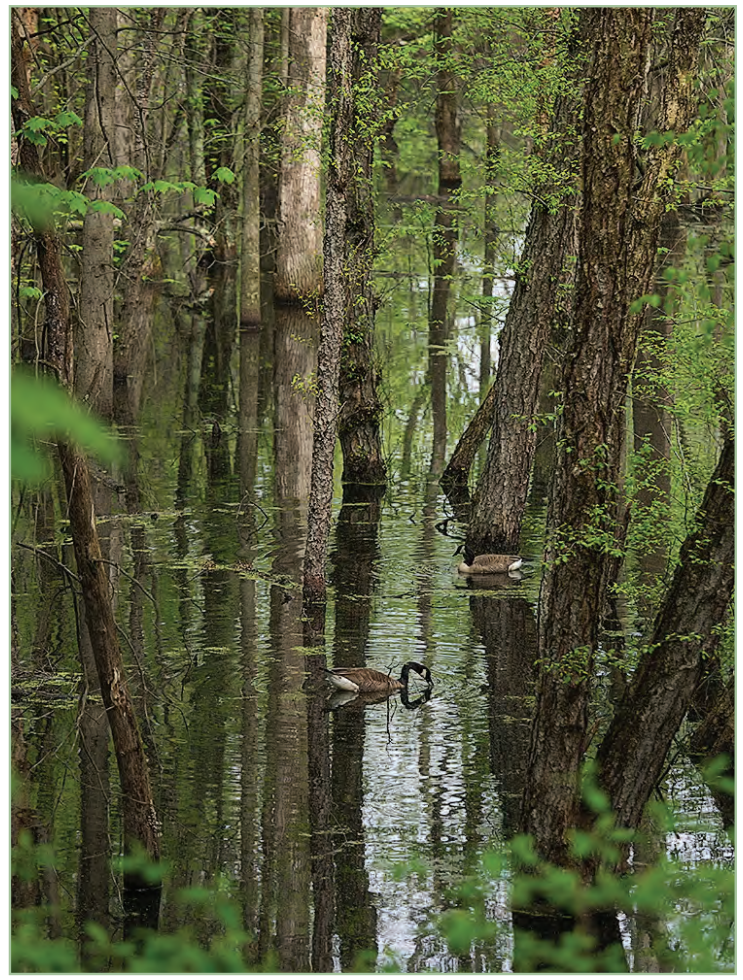
I only saw pelts briefly, through the swarm of breeches and petticoats passing on the thoroughfare — a small pile of former animals at the feet of a rugged-looking trapper-like man, dressed head to toe in buckskin. Before I could get a closer look, I was distracted by a passing formation of a dozen or so Colonial soldiers. They had come marching out of the fort's gateless sallyport with a fife and drum in front, setting the pace. They turned down the thoroughfare, trailed by half a dozen boys, convincingly dressed as period ragamuffins and shouldering wooden muskets.

From there I set off on a merchandise meander: period footwear at (Daniel) Boone Shoe Co., est. 1778; bonnets galore at Flying Heart Millinery; pewter and silver galore at House of Shine; Wm. Rudolph, Purveyor of Maps and Mathematical Instruments; coins, medallions and miscel-

Seasonal park ranger Sterling Ambrose takes a seat in the guard room of the west barrack in Fort Frederick, which is furnished to appear as it would have in the late 1750s.

lany at Three River Trade Co., and much more. After a few hours, I decided to explore the site's historical centerpiece.

The 263-year-old fort has a truly interesting history, both in terms of how it was built and used (briefly, four times) and saved for posterity — nearly 100 years ago as Maryland's first state park. The walls of the fort enclose a square area of roughly 1.4 acres, with outsized arrowhead-shaped bastions at every corner. It was built between 1756 and 1758 (the early years of the French and Indian War, also known as the Seven Years War) under the direction, often in person, of Maryland Gov. Horatio Sharpe. In late 1758, British forces captured Fort Duquesne (now Pittsburgh), pushing the war much farther into the frontier and making Fort Frederick all but unnecessary, except as a supply depot and staging area.



Above: In the spring, Virginia bluebells adorn the forest floor along Fort Frederick's Plantation Trail and along the C&O Canal trail, which follows the Potomac River half a mile south of the fort. Right: Geese make themselves at home in a wooded wetland at the east end of Big Pool, which also parallels the river near the fort.

It didn't stay unnecessary for long. In 1763, the same year the French and Indian War ended, a native uprising known as Pontiac's War (or Rebellion) forced Sharpe to reopen Fort Frederick. About 700 British settlers took refuge there during the three-year conflict that killed many hundreds of soldiers, militiamen, natives and settlers, and altogether displaced around 2,000 of the latter. The fort then fell dormant again until 1777, when it became a prison camp for British soldiers captured during the Revolution.

After that it lay fallow for approximately 150 years, except for a brief occupation by Union troops during the Civil War. Fallow may be the wrong word, actually, because from 1860 to 1911 the fort and its surrounding acreage was part of a large and prosperous farm founded by a free African American named Nathan Williams. In 1911, Williams's descendants sold the property to a private owner, who in turn sold it to the state in 1922 — at which point, according to Park Service literature, it became Maryland's first state park.

Enter the Civilian Conservation Corps in 1934, which repaired the stone walls, sections of which had crumbled or been torn down to adapt part of the fort for farm use. The industrious CCC also turned the site into a proper park, building several of its trademark log structures outside the fort. Those included a superintendent's residence, now the park's gift shop; and the original visitors center, now a CCC museum telling the story of the fort's restoration.

Two re-created barrack-style buildings inside the fort were open during my visit, offering a deep dive into what life was like there in the 1700s. They were built in the 1970s on foundations unearthed four decades earlier by the CCC, and many of the rooms are furnished to reflect the period: enlisted quarters, officers' quarters, mess hall, armory, hospital, store rooms, etc. Other rooms hold modern-day exhibits with maps, photos and large displays covering the fort's history.

If I'd known the many layers of landscape and history that awaited me, I'd have given myself two full days to explore the park and fort, especially during the Market Fair. Unchecked items on my to-do list included not only the gift shop and CCC Museum, but also the park's modern-day visitors center and its mile-long Plantation Trail, which wanders through trees planted in the 1920s and '30s by the Maryland Daughters of the American Revolution. Also, less than a mile from the fort's entrance, is the eastern terminus of the 28-mile Western Maryland Rail Trail.

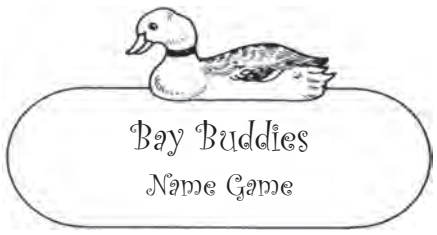
But there's always a next time. Having survived nearly three centuries, Fort Frederick isn't going anywhere.

Fort Frederick State Park

Fort Frederick, 18 miles west of Hagerstown, MD, just off I-70, is open daily year-round: 8 a.m. to dark April through October, and 10 a.m. to dark November through March. For information, call 301-842-2155, visit dnr.maryland.gov and search under "Parks," or visit the Friends of Fort Frederick Facebook page.

Special events this fall include a Provincial Muster weekend Sept. 14–15, a Militia Muster weekend Sept. 28–29, and an artillery and musketry demonstration Oct. 12–13. In observance of Veterans Day weekend, Nov. 9–10, the park will host "One Fort: Three Wars," examining Fort Frederick's role in the French & Indian, Revolutionary and Civil wars.

Fort Frederick's towering walls rise above the park's southern slope, which leads to the Potomac River and C&O Canal Trail.



Learning is fun! Here are the names of some plants and animals that are fun to say out loud. Match them with their description. Answers are on page 34.

DICKCISSEL
FUZZY FOOT
HAIRY BEARDTONGUE
HOBOMOK
KATYDID
MEGALOPS
MUMMICHOG
POLLIWOG
PAWPAW
SKINK
WHISTLEPIG

1. This plant has tubular pinkish to pale-violet flowers that grow in clusters at the top of its hairy stem. A fuzzy stamen sticks out of the lower lip of the flower, which is how it got its name. It has 2– to 4-inch, lance-shaped leaves growing opposite of each other on a hairy stalk. Plant specialists have created many varieties of this wildflower that are found in nurseries. It not only attracts bees, butterflies and hummingbirds, but is shade– and drought-tolerant. It grows well in rock gardens and cottage gardens.

2. This midsize, stocky bird roams grasslands and pastures. It is shaped like a sparrow and sings its own name. The male has a dark gray back and head with rusty shoulder patches, a bright eyebrow and breast, and a black v-shaped bib. The female is similar to the male, but paler and without the bib. It eats seeds year-round and adds insects to its diet in the breeding season. Come fall, they gather in flocks that can number in the thousands while migrating and that can grow to the millions once they reach their wintering grounds.

3. This is another word for tadpole, the larval stage of a toad or frog. In this stage, they are roundish with gills and a tail. After a while, their bodies lengthen, the tail shortens to a nub, and lungs and tiny feet have developed. Their diet also switches from algae and plants to insects and small crustaceans, and they are able to leave the water. They are then called toadlets or froglets until they become adults.

4. This is a member of the skipper family, which is usually classified as a butterfly, but is more of a cross between butterflies (active during the day) and moths (heavier bodies). This black and orange skipper has rounded, triangular wings ranging from approximately 1 inch to 1.5 inches long. It is found in clearings or edge habitat, where it sips nectar from flowers such as common milkweed and blackberry flowers. Its caterpillars eat grasses, especially panic grasses and bluegrasses.

5. This hardy killifish, also known as a mud minnow, can tolerate pollution, low oxygen, and temperature and salinities. It can eat 2,000 mosquito larvae in one day and is used to control mosquitos in ditches and ponds. Hundreds of these fish can gather together in schools. Its name is the Native American word for "going in crowds."

6. Is it a groundhog? Woodchuck? Marmot? This is yet another name for this large rodent that can swim and easily climbs trees to get food or escape predators.

7. Even the Latin name for this species, which means "little dry navel," is amusing. This small, pale orange to pale yellow mushroom has yellow/orange hairs at the bottom of its brown stalk. It starts out as a cap mushroom, but the outside of the cap gets larger as it ages and creates a depression in the center. In a wet season, this fungus can completely cover a tree stump.

I am a photo of clue #9. I was discovered when photographer Dave Harp picked up a board at a former home near the Nanticoke River in Maryland. (Dave Harp)

8. This tree bears one of the largest edible fruits in North America. Usually found in wetter habitats, this understory tree can grow up to 25 feet high with dark shiny leaves up to a foot long. The applelike, yellow-brown fruit can grow up to 6 inches long and weigh a pound. People who are lucky enough to pick one before wildlife get to it say the creamy-textured fruit tastes like a combination of banana, pineapple and mango.

9. This lizard has a cone-shaped heads, thick neck and small feet. It moves like snakes and is often mistaken for one. It eat plants and small animals and has strong jaws that can crack the shells of beetles and snails. When an animal tries to eat it, its tails breaks off and continues to wiggle, which distracts the predator. Juvenile tails are bright blue.

10. This is the second larval stage of the blue crab. At this stage, the crab's abdomen is getting longer, and the legs and other abdominal appendages are present. The eyes are large.

11. This grasshopper cousin looks like a green leaf, which makes it hard for predators to find it. This insect is nocturnal and often hangs out in trees — eating leaves and dead insects — which also makes it hard for us to see them. We can hear it and its kin, though. When it rubs its two forewings together, it makes a sound that resembles its name.

— Kathleen A. Gaskell

Words for the Wise

"Anyone who stops learning is old, whether at 20 or 80. Anyone who keeps learning stays young. The greatest thing in life is to keep your mind young."

— Henry Ford

You're never too old to learn new words. And if Ford is right, you'll be much younger when you finish this quiz. Here's a list of out-of-the-ordinary terms that popped up during research for other Challenges over the years but never made it into a column. Match them with their definitions. Answers are on page 34.

ABSCISSION
ANTHOCYANIN
CREPUSCULAR
EYASES
KLEPTOPARISITE
MARCESCENCE
SIBLICIDE
VOMERINE
XANTHOPHYLL
ZOEAE

1. This is what osprey and other hawk nestlings are called. It is derived an old French word meaning nest.

2. This is the term for when a plant or animal intentionally sheds a part of itself. Trees shed leaves. Plants shed seeds. Some lizards shed tails to escape capture. Some starfish shed an arm to avoid overheating when their environment is too warm.

3. This is the first larval stage of the blue crab. It is free-swimming with a spiny shell and early-stage legs.

4. This is the yellow pigment in leaves. It is usually concealed by chlorophyll, which is green. When trees stop making chlorophyll in the autumn, the yellow is visible.

5. This is the term to describe animals that are active at dawn and dusk.

6. This sugar-related pigment makes plants red, purple, blue or black. If there is the right combination of sunny days and cool nights in autumn, some trees produce this pigment, which turns leaves fiery red.

7. This is a term for when one animal steals food that has been killed, gathered or stashed by another. The bald eagle is known for doing this, and it was one of the reasons that Ben Franklin opposed naming it our national bird.

8. This word refers to the killing of a young animal (usually a bird) by its fellow nestlings. It frequently occurs when food resources are scarce and ensures that the fittest of the youngsters survives.

9. This is when a plant holds onto dead parts that are usually shed. This is often seen in oak and beech trees when a few branches hold onto their dead leaves until spring.

10. This word is related to a bone found in the mouths of most vertebrates. It also describes rows of pointed, paired teeth growing out of the roof of a frog's mouth that hold onto prey while the frog swallows it whole.

— Kathleen A. Gaskell

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Tickseed sunflowers bloom in a Dorchester County, MD, marsh. (Dave Harp)

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Upper Marlboro, MD

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Kent Murray
Vienna, VA

John Pjura
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Peter Powell
Pasadena, MD

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Edward Ruskowsky
Hollywood, MD

John Sheridan
Lexington, VA

Phil & Anne Townsend
Virginia Beach, VA

In Memory
of Andy Gene Anderson
from Jo Anne Anderson
Chester, VA

Wellis Balliet
Nescopeck, PA

Joseph Baranowski
Dundalk, MD

Bowers Publishing
Street, MD

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Severna Park, MD

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A showy lotus blossoms on Turner's Creek, a tributary of the Sassafras River near Kennedyville, MD. (Dave Harp)

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of Joan
from Gene Hicks
Bel Air, MD

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Forum

Commentary • Letters • Perspectives

Promise to protect fully Rappahannock site still a cliffhanger

By Joe McCauley

Former refuge manager Joe McCauley with Heather Richards of the Conservation Fund look out from Fones Cliffs in May 2019. (Dave Harp)

I first saw Fones Cliffs in spring 1997. I was in the company of the renowned author and naturalist John Page Williams, and I was there to help celebrate the establishment of the Rappahannock River Valley National Wildlife Refuge.

The Fones Cliffs formation stretches along 4 miles of the river's shore, reaching heights of more than 100 feet. In the late afternoon sun, the cliff face sparkles from diatomaceous earth (fossilized remains of marine phytoplankton) deposited millions of years ago.

That day a seed was planted in me, somewhere in my heart, my soul — or maybe my left pinkie — I'm not sure. But it stayed with me, somewhat dormant, until June 2000, when my dream of becoming the manager of this new refuge on the Rappahannock River became a reality.

At that point, the conservation of Fones Cliffs grew into a personal commitment. The cliffs were then — and are today — ranked among the highest priorities for land conservation in the refuge's Land Protection Plan, confirming my marching orders.

Back then, I was only aware of the wildlife values of the cliffs: the spectacular concentration of bald eagles, the nesting and migrating songbirds — many of conservation concern and therefore a priority — and the rafts of waterfowl that find optimal habitat in the river and protected marshes across from Fones Cliffs.

Those values, and my commitment to protect them, were significantly augmented with the establishment of the Captain John Smith Chesapeake National Historic Trail by the National Park Service. During the planning stages of the trail, I became aware of the people who share their name with this remarkable river, the Rappahannock Tribe.

As I did more research, I found that the tribe not only inhabited most of the land within the refuge boundary at the time of Smith's explorations but had a noteworthy encounter with Smith and his men right below the cliffs in August 1608.

I was fascinated, not only to learn about the history of the places I was managing, but to realize that the tribe persists despite a concerted attempt to legislate them out of existence by Virginia's Racial Integrity Act of 1924. Today, I gratefully count tribal members as friends and co-warriors in the fight to conserve Fones Cliffs.

During my 10 years as refuge manager (2000–2010) and then as the U.S. Fish and Wildlife Service's Regional Realty Officer (2010–2015), I tried, really tried, to put the pieces together to acquire any and all of the three major tracts that make up the cliffs. The USFWS and its nonprofit partners — The Nature Conservancy, The Trust for Public Land and The Conservation Fund — met with landowners, conducted several appraisals and made offers to purchase land.

We came tantalizingly close but ultimately fell flat, mostly because of a period of market volatility during which the appraisals were not in sync with rapidly escalating land values and lack of appropriations from the federal Land and Water Conservation Fund.

When I retired in 2015, I stated publicly that I would not rest until Fones Cliffs was protected. That was perhaps a bold statement from an aging wildlife biologist and refuge manager.

Fortunately, the Chesapeake Conservancy came into my life and provided a means to uphold my promise. Since retirement, I have had the privilege to serve as Chesapeake Fellow for the Conservancy, and to my delight, they have made the conservation of Fones Cliffs the centerpiece of their land conservation work in the Chesapeake Bay watershed.

Along with dozens of government and nonprofit partners, and with tremendous bipartisan political support, the Conservancy helped spearhead the Rivers of the Chesapeake Land and Water Conservation Fund Collaborative Landscape proposals that delivered more than $30 million to the Chesapeake Bay region from 2015–18, including $3.6 million to Rappahannock River Valley Refuge and more than $6 million to the Chesapeake Trail.

Finally, in 2019, The Conservation Fund had a breakthrough with one of the landowners. They purchased a 252-acre property in the heart of the Fones Cliffs formation that had been rezoned in 2015 and slated for a 47-unit housing development. In May 2019, the USFWS purchased the property from The Conservation Fund, adding it to the refuge, and relegating that particular housing development to a fast-fading memory.

The refuge is already making plans to invite visitors to witness the breathtaking views, to relish the sights and sounds of bald eagles, and to reflect on the environmental changes in the past 400-plus years while standing in a place that has changed little.

So is that it? Am I done? Have I fulfilled my promise? Short answer: no. Sadly, the adjoining property of 968 acres has also been rezoned and is the proposed site for an 18-hole golf course, more than 700 housing units, a lodge, a restaurant and more. As I write, the company has been cited by the Virginia Attorney General for environmental violations. While it is too early to know for certain what that means for the proposed development, it is certain that continued vigilance is required.

Fortunately, the Chesapeake Conservancy, USFWS and the many individuals and organizations who have persistently waged the campaign to save Fones Cliffs remain as committed as I. To all the partners, I say "thank you" for helping me keep my promise.

Joe McCauley is retired from the U.S. Fish and Wildlife Service and is currently a Chesapeake Fellow with the nonprofit Chesapeake Conservancy.

Forum

Commentary • Letters • Perspectives

Chesapeake continues to be a classroom for its retired iconic educator

By Tom Horton

It was the best day I would spend in a "classroom," drifting through the summer wetlands of the Patuxent River as the "professor" stood tall in his canoe, informing his floating gaggle of schoolchildren about plankton, fish and the food web; of birds that had flown across the continent to harvest the swelling crops of seed from the tidal marsh; and the joy and wonder of how it all fit into the greater Chesapeake ecosystem.

That was some 40 years ago, and John Page Williams was already the iconic educator for the Chesapeake Bay Foundation. The methods he perfected in those old aluminum canoes are still emulated throughout the Bay region and beyond.

"He was hands-on — on the water, in the water, in small boats," recalled Don Baugh, who would later lead the foundation's outdoor programs. "All that became a standard that was replicated around the Bay and eventually incorporated in national programs, like NOAA's Meaningful Watershed Educational Experiences."

That day on the Patuxent, John Page was also training a young educator not long out of college, Cindy Dunn. "He taught me [that] 'being a girl' was no excuse for not loading 75-pound canoes onto the trailer," said Dunn, who is now Pennsylvania's Secretary of Conservation and Natural Resources and is still paddling her native Susquehanna.

When I heard John Page would be retiring, I suggested an interview at his office at the Bay Foundation's headquarters. Silly thought.

"Meet me at the boat ramp," he said.

It's been nearly half a century since the young Princeton graduate from Virginia got a $10 membership in the foundation for a birthday present. Environmental education wasn't the first direction he'd considered back then. He did a couple years in a seminary after college. "But I just couldn't stay off the water," he said.

By 1973, he'd been hired as the foundation's first environmental educator. The nonprofit organization, begun in 1967, had only a couple of thousand members then (compared with more than 200,000 now) and didn't own a vehicle, so John Page hauled its eight canoes in his own pickup, reimbursed at 10 cents a mile.

On a sultry morning this summer, we met at a creek of the Severn River

John Page Williams shows off the abundance of aquatic grasses in Maryland's Severn River. (Dave Harp)

Chesapeake Born

just north of the U.S. 50 bridge. John Page was towing the same 17-foot Whaler he's used since 1993 to explore virtually every river and creek of the Chesapeake.

He loaded aboard rods and reels, nets, oxygen meters and more, tools to see the Severn through many lenses, in search of everything from white perch to dead zones. Half an hour later the boat was still on the ramp as its captain prowled the shoreline for grass shrimp, poking at the gravelly bottom and marshy fringes, all along commenting on the state of the river (underwater grasses good, pickerel terrible, oysters — it depends).

I expected no less from a man who opened his lovely 1993 book, *Exploring the Chesapeake in Small Boats*, with this: "[W]e did not have a destination in mind, and a quick trip was not our intention."

He also advised readers to "pick one area and spend some time exploring it." And he has done just that for 46 years now, progging about this roughly 5-mile stretch of the Severn near his home. No fish or great blue heron is more intimate here.

We cruised over catfish on the depth finder, which soon showed a little "lump" that John Page discovered years ago, a slight rise in the bottom 25 feet down. On a hunch, he got the Bay Foundation to partner with other groups to place concrete "reef balls" on the lump — which was always plagued by low-oxygen water in the summer but can yield big, 13– to 14-inch white perch when fall temperatures bring better water quality.

He knew another deep spot where sunken railroad timbers down by the U.S. Naval Academy create enough turbulence as the tide moves in and out to oxygenate the bottom — at nearly three times the level found on the upper lump.

The reef balls might do the same, he thought. For good measure they were "set" with oyster spat. It's been a mixed success, he told me. There's still too little oxygen, and the oysters failed to get a foothold. "[But] we've got live bottom," he said, always quick to accentuate the positive. The lump, he said, now has worms and two species of mussels all summer.

Our next stop, Aisquith Creek, is a straight-up success story — where a sanctuary oyster reef built on concrete rubble now sports masses of bivalves, some to 6 inches. And what looks like a pollution slick in the shallows between the reef and the shore turns out to be underwater meadows of native Bay grasses so thick they calm the choppy waters above them to a smooth sheen. Redhead grass, wigeon grass, pondweed — we counted five species.

"In my 46 years, the river's come a long way back," John Page said. "The late 1970s and early 1980s were not a happy time. We couldn't catch fish anywhere below a few feet. The grasses were gone."

The Severn is all but entirely hemmed in by suburbs, so septic tanks and stormwater runoff make water quality improvements an uphill battle. But in recent decades, he said, better runoff controls and development restrictions, mostly under Maryland's Critical Area Act of 1984, are boosting a comeback.

"Within a hundred yards I can show you things out here that make you smile and clap your hands, also things that make you cry," he said. "And that is the story. The Clean Water Blueprint [for restoring the Chesapeake] is working, but we've got systemic problems and a long way to go."

A thunderstorm chased us off the river before we could cast a line. But as the Bay's master educator once wrote:

"Our excuse to the world was that we were fishing, but we were looking [at] tides, temperature, salinity, birds, plankton … plugging ourselves into the system, ready to be grateful for whatever it had to offer us."

Amen.

Tom Horton has written about the Chesapeake Bay for more than 40 years, including eight books. He lives in Salisbury, MD, where he is also a professor of environmental studies at Salisbury University.

Forum

Commentary • Letters • Perspectives

Delmarva Oasis protects what we see, what we may yet see

By Rob Etgen

I spent my childhood in and around the Bay wading in our creek to catch soft crabs, trying to dip net yellow perch on their spring run, catching a mess of perch on peelers and paper-shells, and lazing around summer afternoons while swimming or floating down the river. I thought there was nothing in the Chesapeake Bay that I had not seen, sought, munched or been scraped by — until this year.

In late August, the Eastern Shore Land Conservancy purchased a large tract (1,172-acres) in Queen Anne's County, MD, with more than 700 acres of prime farmland and beautiful rambling forests.

Protecting this farm had been a priority for the conservancy for more than two decades, mostly because it was one of the largest remaining unprotected farms on the Eastern Shore. It is also a large part of the headwaters of Southeast Creek and precisely in a band of habitat uniquely suited for federally endangered dwarf wedge mussels. Over the last 10 years, the conservancy has been protecting land and encouraging buffers and soil conservation on the farms along these headwater streams to protect the mussels.

While in the stream looking for the mussels during a tour of the property last spring, I noticed some small ribbonlike creatures displaying obvious spawning behavior: raking the gravel, making egg deposits and milking. At first, I had thought they were eels but then recalled that the eel native to this area spawns in the Sargasso Sea in the South Atlantic Ocean.

These shoelace-like creatures were brook lampreys — a native of the Bay that has a mildly parasitic relationship with rockfish and other semi-anadromous fish, as well as a potentially symbiotic relationship with dwarf wedge mussels.

My experience highlights the enormity of what we don't know about the Bay or the lands and waters right here in our backyards on the Delmarva Peninsula.

E. O. Wilson, the planet's preeminent ecologist, in his most urgent book to date, *Half-Earth: Our Planet's Fight for Life*, calls for everyone to work together to save 50% of the planet's lands and waters as the necessary infrastructure for life. Wilson figures that protecting 50% of the planet is equal to protecting 85% of its species — including ourselves.

Much of the concern lies not with the species *we see* going extinct, but with the immensity of species that are yet undiscovered. In 2015, the number of known species surpassed 2 million, yet some scientists estimate that more than 100 million species exist today.

After more than 30 years of progress cleaning up the Bay and saving our lands and waters on the Eastern Shore, the Eastern Shore Land Conservancy has made incredible strides forward.

But with a new Bay Bridge and other road-building on the horizon, combined with an expected retreat in federal support for conservation while our climate changes at an accelerating pace, we must do more and we must act quickly.

Southeast Creek flows through a wooded wetland on a farm in Queen Anne's County, MD, that has recently been protected by the Eastern Shore Land Conservancy. (Dave Harp)

The conservancy's new Delmarva Oasis initiative, with its goal to protect 50% of the entire Delmarva Peninsula, is a critical next step for conservation. Saving 50% of this portion of the Delmarva means saving not only 85% of its species — known and unknown — but also its food-producing fertile soils, beautiful landscapes, small towns and our high quality of life.

Saving land for the future is the most enduring gift we can give to our children. As Joni Mitchell reminds us in *Big Yellow Taxi*: "…don't it always seem to go that you don't know what you've got 'til it's gone. They paved paradise and put up a parking lot."

Rob Etgen is president of the Eastern Shore Land Conservancy.

Chesapeake Challenge

Answers to
Words for the Wise
on page 28.

1. Eyases 2. Abscission
3. Zoeae 4. Xanthophyll
5. Crepuscular 6. Anthocyanin
7. Kleptoparisite 8. Siblicide
9. Marcescence 10. Vomerine

Bay Buddies

Answers to
Name Game
on page 28.

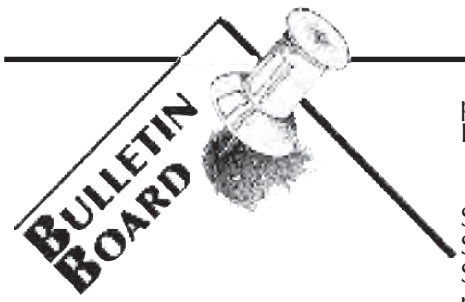
1. Hairy Beardtongue 2. Dickcissel 3. Polliwog 4. Hobomok 5. Mummichog 6. Whistlepig 7. Fuzzy Foot 8. Pawpaw 9. Skink 10. Megalops 11. Katydid

Let Us Know

The Bay Journal welcomes letters pertaining to Chesapeake Bay issues. Letters should be no more than 400 words. Send letters to: Editor, Bay Journal, 619 Oakwood Drive, Seven Valleys, PA 17360-9395. E-mail letters to: bayjournal@earthlink.net

Letter writers should include a phone number where they can be reached. Longer commentaries should be arranged in advance with the editor. Call: 717-428-2819.

Views expressed are those of the writers and do not necessarily reflect those of the Bay Journal or Bay Journal Media.



Volunteer Opportunities

Howard County Conservancy

The Howard County Conservancy needs leaders for elementary and secondary school hikes. No experience is necessary. Volunteers choose which hikes they would like to do. There is no minimum or maximum requirement. Volunteers are also needed for various events. Info: Carole at 410-465-8877, volunteer@hcconservancy.org.

Bear Creek stream cleanup

The organization, Clean Bread and Cheese Creek, needs volunteers of all ages and abilities to help remove trash and log jams from the mouth of Bear Creek 9 a.m.–2 p.m. Sept. 28. Meet at Bear Creek Park in Dundalk, MD. Trash bags, gloves, snacks, water, and lunch will be provided. A limited number of tools are available for loan; participants are asked to bring their own if possible. Registration opens at 8 a.m. Service learning and community service hours are available for students. Info: 410-285-1202, info@BreadandCheeseCreek.org.

Anita Leight Estuary Center

Anita C. Leight Estuary Center in Abingdon, MD, needs volunteers, ages 14 & older, for its *Invasinators Workday* 2–4 p.m. Sept. 29, weather permitting. Participants will remove invasive species and install native plants around the center. Wear sturdy shoes, long sleeves and work gloves. Registration is required: 410-612-1688, 410-879-2000 x1688, otterpointcreek.org.

Irvine weed warriors

Irvine Nature Center in Owings Mills, MD, needs *Weekend Weed Warriors*, ages 14 & older, 11 a.m.–4 p.m. Sept. 21 to remove invasive oriental bittersweet and multiflora rose near the Woodland Garden and Native American sites. Training and tools are provided. Wear sturdy shoes that can get wet/muddy; bring water and a non-refrigerated snacks/lunch. Info: Ben Fertig: fertigb@explorenature.org.

Cromwell Valley Park

Volunteer opportunities at Cromwell Valley Park in Parkville, MD, include:

≋ *Habitat Restoration Team / Weed Warrior Days:* 2–4 p.m. Sept. 28; Oct. 12 & 26; and Nov. 2 & 23. All ages (12 & younger w/adult). Help remove invasive species, install native ones and maintain habitat. Service hours are available. Meet at Sherwood House parking lot. Registration not required. Info: Ltmitchell4@comcast.net.

≋ *Trail Guide Training:* 10 a.m.–1 p.m. Sept. 11 (Marshy Point Nature Center); Sept. 12 (Cromwell Valley Park) & Sept. 13 (Hampton National Historic Site). Adults. Learn how to help with programs, special events as well as the ecology of Cromwell Valley and Marshy Point. New subjects, techniques taught each day. Snacks, coffee provided 9/11 & 9/12. Bring a lunch, drinks 9/13 for carpool trip to Hampton NHS. New guides pay a $5 tuition fee.

≋ *Drop-in Gardening:* 9 a.m.–12 p.m. Sept. 14 & 28. Individuals/families, ages 13+ Gloves, tools, water. Bring a hat, sunscreen. No registration.

≋ *Citizen Science / Hawk Watch Weekend:* 9 a.m. Sept. 14 & 15. Willow Grove Hawk Watch Site. All ages. Help count broad-winged hawks migrating through the valley. No registration.

MD Volunteer Angler Survey

Anglers of all ages can become citizen scientists by helping the Maryland Department of Natural Resources collect scientific data through the Volunteer Angler Survey. Anglers record information from their catch such as species, location and size directly to the survey on their smartphone. Biologists use this data to develop, plan and implement management strategies. The artificial reef initiative, blue crab, freshwater fisheries, muskie, shad and striped bass programs have upgraded to mobile-friendly methods. Participants are eligible to win quarterly prizes. Info: dnr.maryland.gov/Fisheries/Pages/survey/index.aspx.

Severn River Association

The Severn River Association in Annapolis needs volunteers to join a team of citizen scientists monitoring water quality on the Severn and its creeks. Weekly tours take place Wednesday and Thursday mornings and last roughly four hours. The season goes to October. Volunteers can sign up for as many tours as they'd like. Info: TAGuay@severnriver.org, 443-569-3556, info@severnriver.org

Volunteer at CBEC

The Chesapeake Bay Environmental Center in Grasonville, MD, has volunteer openings for those who only want to drop in a few times a month to assist with a project or event, or help out on a more regular basis. Openings include: helping with educational programs; guiding kayak trips or hikes; staffing the front desk; maintaining trails, landscapes and the Pollinator Garden; feeding or handling captive birds of prey; maintaining birds' living quarters; and participating in CBEC's team of wood duck box monitors or other wildlife initiatives. Other opportunities include participating in fundraising events and behind-the-scenes operations, website development, writing for newsletters and events, developing photo archives and supporting office staff. Volunteers donating more than 100 hours of service per year receive a complimentary one-year family membership to CBEC. Info: volunteercoordinator@bayrestoration.org.

CBL Visitor Center

Volunteers, ages 16 & older, are needed at the Chesapeake Biological Laboratory's Visitor Center on Solomons Island, MD. Volunteers must commit to a minimum of two, 3– to 4-hour shifts each month in the spring, summer and fall. Training sessions are required. Info: brzezins@umces.edu.

Little Paint Branch Park

Help the Maryland-National Capital Park and Planning Commission remove invasive species 11 a.m. to 3 p.m. the last Saturday in September, October and November at Little Paint Branch Park in Beltsville. Learn about native plants. Sign in for a safety orientation. Gloves and tools are provided. Info: 301-442-5657, Marc.Imlay@pgparks.com.

Ruth Swann Park

Help the Maryland Native Plant Society, Sierra Club and Chapman Forest Foundation 10 a.m. to 4 p.m. the second Saturday in September, October and November remove invasive plants at Ruth Swann 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 the Sierra Club MD Chapter office at 9 a.m. and return at 5 p.m. Carpool contact: 301-277-7111.

Thomas Point Shoal Lighthouse

The National Historic Landmark, Thomas Point Shoal Lighthouse, restored by the U.S. Lighthouse Society, which operates tours in partnership with the Annapolis Maritime Museum, needs volunteers. Info: volunteer@amaritime.org.

Magruder Woods

Help Friends of Magruder Woods 9 a.m. to 1 p.m. the third Saturday in September, October and November remove invasive plants in the forested swamp in Hyattsville, MD. Meet at the farthest end of the parking lot. Info: 301-283-0808, Marc.Imlay@pgparks.com, (301-442-5657 the day of event); or Colleen Aistis at 301-985-5057.

Become a VA Master Naturalist

Virginia Master Naturalists are a corps of volunteers that help manage and protect natural areas through plant and animal surveys, stream monitoring, trail rehabilitation and teaching in nature centers. Basic training covers ecology, geology, soils, native flora and fauna, and habitat management. Info: virginiamasternaturalist.org.

Adopt-a-Stream program

The Prince William Soil & Water Conservation District in Manassas, VA, wants to ensure that stream cleanup volunteers have all of the support and supplies they need for trash removal projects. Participating groups receive an Adopt-A-Stream sign in recognition of their efforts. For info, to adopt a stream or get a proposed site, visit waterquality@pwswcd.org. Groups can register their events at trashnetwork.fergusonfoundation.org.

American Chestnut Land Trust

The American Chestnut Land Trust in Prince Frederick, MD, needs volunteers for invasive plant removal workdays 9–11 a.m. Thursdays and 10 a.m. to 12 p.m. Wednesdays. All ages (16 & younger w/adult) are welcome. Training, tools and water are provided. Registration is required. Info: 410-414-3400, landmanager@acltweb.org, acltweb.org.

Creek Critters app

Audubon Naturalist's *Creek Critters* app lets people check their local streams' health through finding and identifying small organisms that live in freshwater, then generating health reports based on what they find. The free app can

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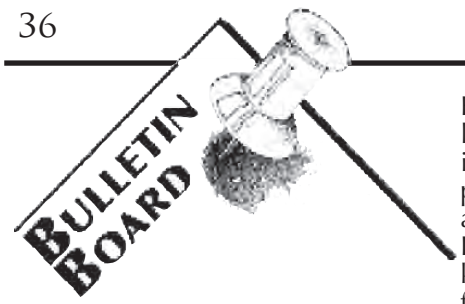
Workday Wisdom

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.



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be downloaded from the App Store and Google Play. Info: anshome.org/creek-critters. To learn about partnerships or host a Creek Critters event: cleanstreams@anshome.org.

Irvine Nature Center

The Nature Center in Owings Mills, MD, needs volunteers, ages 14 & older, for its *Weekend Weed Warriors Workday* 11 a.m.–4 p.m. Sept. 21. Help remove oriental bittersweet and multiflora rose. Training and tools are provided. Wear sturdy shoes that can get wet/muddy; bring water, nonrefrigerated snacks/lunch. Meet at the main entrance. Registration required: 443-738-9230, fertigb@explorenature.org.

Marine mammals, sea turtles

The Maryland Department of Natural Resources asks anyone who has seen a marine mammal or sea turtle in Maryland waters to report it to the state Marine Mammal and Sea Turtle Stranding program at 1-800-628-9944. Anyone who finds a stranded marine mammal, alive or dead, should follow these steps: Do not touch the animal; record the location using latitude/longitude, street address, and/or description with landmarks; estimate and record the length, size, color, noticeable body parts, and movements (if alive); take photos; keep a safe distance until stranding staff arrive. Marine mammals are protected by the federal Marine Mammal Protection Act. In addition, sea turtles and whales are protected under the 1973 Endangered Species Act. It is illegal to harass, capture or collect these marine species, alive or dead, including bones or body parts.

Resources

Wetlands Work website

The Chesapeake Bay Program's website, *Wetlands Work*, wetlandswork.org, helps to connect agricultural landowners with people and programs that can support wetland development and restoration on their land.

Stormwater class

The Alliance for the Chesapeake Bay has released the online *Municipal Online Stormwater Training Center's Dig Once Course*. Developed by the Local Government Programs staff and the University of Maryland's Environmental Finance Center, the course offers local leaders ways to integrate green infrastructure into community capital projects such as road construction and school and park improvements. Interactive lessons, videos and knowledge checks in a user-friendly format provide communities with tools to better communicate about, build and enhance local stormwater programs. Info: mostcenter.org.

Learn if your yard is Bay-Wise

Master Gardeners in Prince George's County (MD) takes part in *Bay-Wise*, a program that offers free consultations on sound environmental practices to county residents to help certify their landscapes as Bay-Wise. They look for healthy lawn maintenance, efficient watering and pest control, and native trees and plants that provide shelter and habitat for wildlife as well as suggest approaches to reduce pollution. Bay-Wise signs are given to homeowners who demonstrate these practices. Homeowners can also evaluate their property online using the MD Yardstick, which tallies their pollution-reducing gardening and landscaping practices. To have a yard certified, though, homeowners need to have the Master Gardeners visit and evaluate their landscape. Info: Esther Mitchell: estherm@umd.edu, or visit extension.umd.edu/baywise/program-certification. Click on "download the yardstick" to evaluate a landscape and/or vegetable garden.

Turf / lawn programs

For information on the Prince William (VA) Soil & Water Conservation District's *12 Steps to a Greener Lawn / Building Environmental Sustainable Turf BEST Lawns* programs, low-cost, research-based programs for lawn education, contact: 703-792-4037, bestlawns@pwcgov.org.

Floatable monitoring program

The Prince William Soil & Water Conservation District in Manassas, VA, needs volunteers to help assess and trace trash in streams as part of an effort to reduce nonpoint source pollutants in urbanized and industrialized areas in relation to the County's Municipal Separate Storm Sewers (MS4) permit. Cleanup supplies are provided. Info: waterquality@pwswcd.org.

5 MD libraries offer fishing gear

The Maryland Department of Natural Resources' Aquatic Resources Education Program is providing rods and reels, tackle and fishing books geared toward children to the Eastport-Annapolis Neck Community and Mountain Road Community libraries in Anne Arundel County; Westminster Branch Library in Carroll County; Brunswick Branch Library in Frederick County; and Joppa Branch Library in Harford County. The goal is to foster the next generation of anglers by cultivating a passion for outdoor recreation and nature. The libraries, which are close to public fishing areas, have partnered with local fishing clubs to ensure inventory levels and maintenance of the equipment.

New Submission Guidelines

The *Bay Journal* regrets it is not always able to print every notice it receives because of space limitations. Priority is given to events or programs that most closely relate to the preservation and appreciation of the Bay, its watershed and resources. Guidelines:

- **Send notices to kgaskell@bayjournal.com.** Items sent to other addresses are not always forwarded before the deadline.
- *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 month. Deadlines run at least two months in advance. See below.
- Submissions to *Bulletin Board* must be sent either as a Word or Pages document, or as simple text in the body of an e-mail. PDFs, newsletters or other formats may be considered if there is space and if information can be easily extracted.
- Programs must contain all of the following information: a phone number (include the area code) or e-mail address of a contact person; the title, time (online calendar requires an end time as well as a start time), date and place of the event or program. Submissions must state if the program is free, requires a fee, has age requirements, has a registration deadline or welcomes drop-ins.
- **October issue: September 11**
- **November issue: October 11**

Baltimore Biodiversity Toolkit

There is a well-known need for high-quality and accessible green space in Baltimore, not only for native plants and animals, but for residents as well. The *Baltimore Biodiversity Toolkit* helps communities accomplish this by identifying ambassador animals that represent habitat types within, and historic to, this area; sharing resources for supporting specific wildlife needs; monitoring and encouraging the collection of citizen science data; and developing a culture of conservation and stewardship of community land. The toolkit contains 20 ambassador wildlife species representing four habitats. These animals represent a variety of conditions that are present in high-quality environments for human, plant and animal health. The multi-platform toolkit will help partners prioritize community greening projects based on representative species, citizen science data and spatial analysis that includes social, economic and ecological indicators. Info: fws.gov.

Events / Programs

Lynnhaven River festival

Lynnhaven River Now's *Annual Fall Festival* takes place 11 a.m.–3 p.m. Oct. 12 at Mount Trashmore Park in Virginia Beach. This year's festival kicks off LRN's *Planting for the Future* tree campaign. This free family-friendly event includes educational exhibits, workshops, live music and children's activities, many of them focused on the importance of trees. More than 70 vendors will offer healthy, local and sustainable products and services. Throughout the year, the group will emphasize the role of trees in the environment. Info: lynnhavenrivernow.org, facebook.com/LynnhavenRiverNOW.

Horn Point Lab Open House

The University of Maryland Center for Estuarine Studies Horn Point Laboratory in Cambridge, MD, invites the public to its open house 11 a.m.–4 p.m. Oct. 12. Learn about cutting-edge research by its faculty and graduate students through exhibits, presentations and hands-on activities. Board the research vessel Rachel Carson to explore aquaculture and the boat basin. Visit the East Coast's largest oyster hatchery. Visitors can: fly a drone over a digital Chesapeake map; play in a digital sand box to create shorelines and model weather's impact around the Bay; watch an animation of oyster larvae moving from the reef where they spawned to a permanent home reef; match up a DNA sequence to microscopic creatures in a food chain; learn about sturgeon; and build a healthy marsh while learning who are our best partners in this effort. Activities in the children's booth include creating eco-friendly marine animals; games that teach fun facts about the Bay; a scavenger hunt through the exhibits to learn how the Bay's lasting health starts with everyone making a cleaner environment. The event is free and takes place rain or shine. Directions: umces.edu/directions-horn-point-lab. Info: Carin Starr 410-221-8408 or cstarr@umces.edu.

MD bird stamp design contest

The Maryland Department of Natural Resources invites artists to

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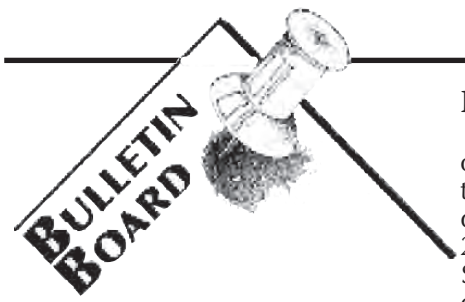

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submit their original works for the *46th Annual Migratory Game Bird Stamp Design Contest* by Nov. 1. The winning entry will appear on the 2020–21 Migratory Game Bird Stamp hunters purchase to hunt migratory game birds in Maryland. This year, the contest will be held in conjunction with the *49th Annual Waterfowl Festival* in Easton, Nov. 8-10. The festival's People's Choice Award lets attendees vote for their favorite entry. The department selects the winner at noon on Nov. 10. Each contestant may submit up to three entries for a fee of $15 for one entry, $20 for two entries, and $30 for three entries. Proceeds help fund game bird and waterfowl research and projects. All entries must be original works, neither copied nor duplicated from any previously published paintings, drawings, prints or photographs. Contestants must mail their designs with required fees and forms by Nov. 1. Info: dnr.maryland.gov/wildlife/Documents/DuckStampContest.pdf.

Mt. Harmon Plantation

Mt. Harmon Plantation in Earleville, MD, invites the public to its *National Revolutionary War Reenactment & Colonial Festival* 10 a.m.–4 p.m. Oct. 12 & 10 a.m.–3 p.m. Oct. 13. The event features British and Revolutionary encampments; battle re-enactment, colonial marketplace, hearth cooking, camp tours, children's musket drill, and local food and beverage vendors Admission is $5. Info: mountharmon.org, info@mountharmon.org.

MD Lighthouse Challenge

Chesapeake Chapter's *2019 Maryland Lighthouse Challenge* takes place 8 a.m. to 6 p.m. Sept. 21–22. Participants can visit any of the lighthouses/lightship on the Challenge route — Concord Point, Seven Foot Knoll, Lightship Chesapeake, Hooper Strait*, Choptank River Replica*, Drum Point, Cove Point, Piney Point, Point Lookout, Fort Washington, Sandy Point Shoal Lighthouse* — to collect a souvenir from each. (Starred lights can be visited on Sept. 20.) Those who visit all of the sites will collect the challenge's "completion" souvenir. Two bonus lights — Millers Island Lighthouse and Blackistone Lighthouse Replica — offer souvenirs but do not count toward the challenge. Info: Cory Talbott, challenge@cheslights.org

Dee of St. Mary's public sails

The Calvert Marine Museum is offering two-hour public sails aboard the historic skipjack Dee of St. Mary's, departing from the museum dock at 2:30 p.m. Sept. 15 and 28. Tickets are $25/ages 13+ and $15/ages 5–12. No children younger than 5 permitted. Advance reservations are taken at bit.ly/DeeOfStMarysCruises by noon the Friday prior to the sail. Remaining tickets are sold at the admissions desk the day of the sail. Info: Melissa McCormick at 410-326-2042 x41, melissa.McCormick@calvertcountymd.gov.

Ladew Gardens

Upcoming events at Ladew Gardens in Monkton, MD, include:

≋ *20th Anniversary of the Nature Walk:* 11 a.m.–3 p.m. Sept. 14. To celebrate the Nature Walk's 20 years, Ladew commissioned an entrance gate, developed new family-friendly educational and informative signage, constructed a new bird watching blind, added floating wetlands and upgraded the boardwalk through the forest. The event includes guest speakers, art, music and environmental learning stations featuring live animals. The celebration is included in general admission: $13/adults; $10/ages 62+ & students; $4/ages 12 & younger. Info: Rachelle Fowler at rfowler@ladewgardens.com, 410-557-9570 x225.

≋ *Evening Lecture & Dinner / Monarchs & Milkweed:* 6:45 p.m. (dinner) & 7–8 p.m. (lecture) Sept. 19. Anurag Agrawal, of the Department of Ecology & Evolutionary Biology at Cornell University, will discuss how the monarch butterfly has evolved closely alongside milkweed over the millennia, how plant poisons have not only shaped monarch-milkweed interactions but also been culturally important. Fee: $50. Tickets: ladewgardens.com/education/Adult-Education/Lecture-Series

MD youth fishing rodeo

The MD DNR Fishing & Boating Services and Baltimore City Parks & Recreation invite children, ages 3–15, to a free *Youth Fishing Rodeo* at Baltimore's Patterson Park. Participants learn basic angling skills; develop an understanding of the environment and natural resources; and have an experience that fosters interest in conservation and fishing. Because of space limitations, would-be attendees should call Bob Wall at 410-245-0854.

Taste of the Chesapeake

The Alliance for the Chesapeake Bay's annual gala, *Taste of the Chesapeake,* takes place 6–9 p.m. Sept. 26 at the Crowne Plaza in Annapolis. During the event, the Alliance recognizes its environmental leadership award winners and showcases the Bay's restoration. The evening includes Chesapeake-inspired food and drink, live music, raffles and a silent auction. Tickets are $125. Proceeds from the fundraiser support the Alliance's work across the watershed. Info, including sponsorship opportunities: allianceforthebay.org.

Thomas Point Shoal Lighthouse

The Annapolis Maritime Museum is offering tours of the Thomas Point Shoal Lighthouse 9–11 a.m. & 12–2 p.m. Sept. 28 and Oct. 5. The tour include 30-minute boat rides to and from the lighthouse, with opportunities to photograph it from every angle, and a one-hour interior tour, where visitors, who must be 12 & older, learn about the light's history, the life of a keeper and the role of the U.S. Coast Guard. Tours require some physical exertion. Tickets are $80 and help to fund the lighthouse's restoration. Info: amaritime.org, uslhs.org.

Manada Conservancy

Manada Conservancy invites the public to these events:

≋ *Owl Pellet Lab:* 10a.m.–12 p.m. Sept. 21. Camp Catherine in Hershey, PA. Middle school students. Dissect owl pellets, learn about owls, food webs, animal anatomy. Free. Registration required. Info; 717-566-4122, office@manada.org.

≋ *Third Annual Walk in Penn's Woods:* 1–3 p.m. Oct. 6. Ibberson Conservation Area (East) in Powell's Valley, Halifax, PA. 1.5-mile walk is over uneven terrain and not suitable for wheelchairs or strollers. Register by Oct. 3. Info: office@manada.org, 717-566-4122. Directions & details: manada.org.

≋ *Watershed Health:* 1-3 p.m. Oct. 6 & 7–8 p.m. Oct. 10. South Hanover Township Building, Hershey, PA. Learn how to protect local watersheds. Free; registration appreciated. Info: 717-566-4122, office@manada.org.

Patuxent Research Refuge

Upcoming programs at the Patuxent Research Refuge's North Tract [T] and National Wildlife Visitors Center [C] in Laurel, MD, include:

≋ *Forest Discovery Tram Tour:* 11:30 a.m., 1 p.m. & 2 p.m. Saturdays and 1 p.m., 2 p.m. Sundays [C] All ages. 45-minute ride highlights how a forest is an interconnected community of plants, animals. Stops will discuss wildlife encountered on the trail. Although the ride is free, tickets are required and are available on a first-come, first-served basis.

≋ *Family Fun / Ducks! Drop in:* 10 a.m. –1 p.m. Sept. 13 & 14 [C] All ages. Patuxent, an important stopover for migratory ducks, is hosting the Federal Duck Stamp Art Contest. Learn about ducks through hands-on activities, games, crafts.

≋ *Owl & Kestrel:* 12:15–12:45 p.m. Sept. 14 [C] All ages. Learn about the acrobatic American kestrel, the stealthy eastern screech owl.

≋ *Early Fall Walk:* 10 a.m.–2 p.m. Sept. 21 [T] Learn about trees, plants important to the fall season.

≋ *Friends of Patuxent Pollinator Festival:* 10 a.m.–2 p.m. Sept. 21.[N] All ages. Children's games, nature walks, monarch tagging will highlight the annual 3,000-mile migration of the monarch butterfly. Milkweed seeds will be given out while supplies last.

≋ *Bird Walk:* 8–10:30 a.m. Sept. 22 [C] All ages. Look for fall migrants. Bring binoculars, good walking shoes, water.

≋ *Nature Tots / Wonderful Wetlands:* 10:30–11:30 a.m. Sept. 24 [C] Ages 3-4. Learn why wetlands are an important habitat. Registration required.

≋ *Federal Duck Stamp Competition:* 10 a.m. Sept. 27 &28 [C] All ages. See this year's entries. Activities for all ages.

All programs are free; donations are appreciated. Except where noted, events do not require registration. Programs are designed for individuals and/or families. Let the refuge know if there are any special needs that need to be accommodated. Info: 301-497-5887, fws.gov/refuge/Patuxent/visit/PublicPrograms.html.

Chesapeake Bay Maritime Museum

Upcoming offerings at the Chesapeake Bay Maritime Museum in St. Michaels, MD, include:

≋ *Open Boat Shop:* 5:30-8:30 p.m. Sept. 12, Oct. 17, Nov. 14 and Dec. 12. Novice woodworkers, who can bring a small woodworking project or ideas for a future project, will receive guidance from an experienced shipwright and woodworker, along with assistance with CBMM's machinery and tools. Participants must be 16+ unless accompanied by an adult. Fee: $35 per session. Preregistration required: cbmm.org/shipyardprograms.

≋ *Ninth annual Elf Classic Yacht Race:* 11 a.m. till finish Sept. 28 on the Miles River. This traditional yacht race, jointly sponsored by CBMM and the Classic Yacht Restoration Guild, includes a 19th century traditional yacht racing start: captains meet on land, a cannon booms, captains dash to a tied-up dinghy or tender to row out to their moored vessels and waiting crews, then race to CBMM's Fogg's Cove, where the captains row to shore to sign the race log. Winners are announced at a post-race reception later. (CBMM will offer a spectator cruise aboard its 1920 buyboat Winnie Estelle 10:30 a.m.–12:30 p.m., with limited boarding and advanced registration at cbmm.org/elfcruise). Entrance to watch

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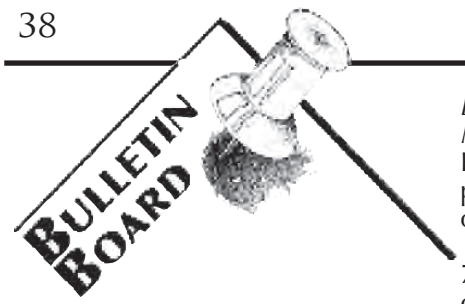

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the race on land is included with CBMM's regular two-day admission.

For race registration information, visit cyrg.org or contact CYRG's Rick Carrion at cyrg.elf@gmail.com or 443-566-2212. The racing fleet is limited, with registration required by Sept. 15, and preference is given to wooden, classic, and traditional yachts. Race proceeds benefit CYRG and CBMM.

≋ *Build Your Own Kayak:* Nine-day workshop meets 8:30 a.m.–6 p.m. Sept. 28–Oct. 6. Participants build a modern adaptation of traditional skin-on-frame kayaks using red cedar and bamboo, "skinned" with nylon and nontoxic polyurethane. Techniques, from traditional *qayaq* communities across the Arctic, include lashing, joinery, steam bending using only a few hand tools. No woodworking or kayaking experience is necessary. Session ends with a group paddle on the Miles River. Fee of $2,100 includes materials. Preregistration required: workshops@seawolfkayak.com, (mention CBMM). Info: cbmm.org or seawolfkayak.com.

≋ *Lighthouse Overnight Adventures for Youths Groups:* Select Fridays & Saturdays, Aug. 30– Oct. 26. Participants, ages 8–12 w/chaperone, learn about the life of a late 19th-century keeper and Bay lighthouses through games, activities, historic objects while spending the night in the 1879 Hooper Strait Lighthouse at CBMM. The experience can be used toward earning badges for Brownie, Junior and Cadette Girl Scouts. Fee: $40 with a 12-person minimum, 18-person maximum. Groups may choose to add a cruise aboard the 1920 buyboat Winnie Estelle, subject to seasonal availability. Overnights are reserved on a first-come, first-served basis, with a $100 deposit needed. Info: cbmm.org/lighthouseovernights. Info: cbmm.org, 410-745-2916.

Natural History Society of MD

Upcoming programs offered by the The Natural History Society of Maryland in Baltimore include:

≋ *Family Science Workshop/ Shellebrate Shells:* 1–3 p.m. Sept. 14. Bring in shells to learn what animal created or used them, how shells are made, why animals use shells, which are most common in the mid-Atlantic, what role shells play in the environment. Family fee: $20.

≋ *Speaker Series / The History, Legend & Science of Psychedelic Mushrooms:* 7–9 p.m. Sept. 14. Presented by William Needham, president of the Mycological Association of Washington. Fee: $15.

≋ *Bird Banding:* 4–6 p.m. Sept. 17; 7:30–9:30 a.m. Oct. 15. See birds up close. Free; donation of $5 suggested to cover material costs. Banding is cancelled if there is rain or temperatures are above 90 or below 50.

≋ *Speaker Series / Discover Maryland's Bird Sanctuaries: From Mountains to Saltmarsh:* 7-9 p.m. Oct. 3. Presented by Marcia Watson of the Maryland Ornithological Society. Fee: $15.

≋ *Wee Naturalist / Bats:* 9:30–11 a.m. Oct. 9. Ages 3–5 w/adult. Music, games, crafts. Fee: $10.

Preregistration is required for all events. Info: Bronwyn Mitchell-Strong at bstrong@marylandnature.org, 443-955-4761, marylandnature.org.

Cromwell Valley Park

Upcoming programs at Cromwell Valley Park's Willow Grove Nature Center in Parkville, MD, include:

≋ *Bird Walks:* 8–10 a.m. Sept. 21, 28; Oct. 5, 19 & 26 and Nov. 2 & 9. Meet at Willow Grove Farm Gravel Parking Lot. Bring binoculars if possible. No registration.

≋ *Counting on Nature:* 1–3 p.m. Sept. 21. Ages 2–5 w/adult. Learn about numbers, animals. Non-mobile siblings only, adult is an active participant. Fee: $4.

≋ *Tour the Sherwood House:* 1–2 p.m. Sept. 22. Meet at Sherwood House. Adults. Behind-the-scenes tour. Fee: $4.

≋ *Polliwog Preschool Club:* 10:30–11:30 a.m. Tuesdays, Sept. 24–Oct. 29 *or* Wednesdays, Sept. 25–Oct. 30. Ages 2–5 w/adult. Hands-on activities, nature play, stories, crafts explore the natural world. Non-mobile siblings only, adult is an active participant. Dress for outdoors. Fee: $80 for 6 sessions. Register only at cromwellvalleypark.campbrainregistration.com.

≋ *Autumn Solstice Bonfire & Smores:* 7:30–9 p.m. Sept. 27. Ages 5+ Fee: $5.

≋ *The Ancient Atlatl:* 1–3 p.m. Sept. 29. Meet at Primitive Tech Laboratory. Ages 13+ Make a simple atlatl from branches, feathered dart. Bring a nonserrated pocket knife, if possible. Fee: $7.

≋ *Night Out with Nature / For Goodness' Snakes!* 7–9 p.m. Oct. 4. Sherwood House. Adults. Kerry Wixted an education and outreach specialist for the Maryland Department of Natural Resources Wildlife and Heritage Service, will discuss state species, snake biology, why we should care about snakes. Fee: $10.

≋ *Apple Press & Prints:* 1–2:30 p.m. Oct. 5. Ages 2–10 w/adult. Learn the true story of Johnny Appleseed, try squeezing cider at an apple press, use apples to make a hand-printed craft. Fee: $5.

≋ *Fall Harvest Festival:* 10 a.m. Oct. 12 (rain date Oct. 13) at Willow Grove Farm. All ages. Pony & hay rides, music, earth oven cooking, apple pressing, apple butter making, beekeeping, family games & crafts, Native American activities, food, 4-H animals. No registration. Suggested donation: $5 per car.

Ages 12 & younger must be accompanied by an adult. Except where noted, programs are free but require registration. Info: 410-887-2503, info@cromwellvalleypark.org, cromwellvalleypark.org. Online registration: cromwellvalleypark.campbrainregistration.com. For disability-related accommodations, call 410-887-5370 or 410-887-5319 (TTY), giving as much notice as possible.

Anita Leight Estuary Center

Upcoming programs at the Anita C. Leight Estuary Center in Abingdon, MD, include:

≋ *Critter Dinner Time:* 10:30 a.m. Sept. 14. All ages. Learn about turtles, fish, snakes while watching them eat. Free. No registration.

≋ *Fall Scavenger Hunt Kayak:* 10:30 a.m.–1 p.m. Sept. 14. Ages 8+ Look for plants and animals on a list. First boat to find all them all wins a prize. Fee. $12.

≋ *Magnificent Monarchs:* 3–4:30 p.m. Sept. 14. Ages 6+ Learn about monarch butterflies, their migration, how to help this creature thrive. Fee: $5.

≋ *Children's Garden Club:* 10:30–11:30 a.m. Sept. 21. Ages 5–8. Cook, create, explore while learning how a garden is connected to humans, the wild world. Fee: $5/child.

≋ *Tails & Tots:* 12:30 p.m. Sept. 22. Ages 0–6 w/adult. Stories, songs, movement. Free. No registration.

≋ *Rumsey Island Kayak Adventure:* 10:30 a.m.–2:30 p.m. Sept. 21. Meet at Mariner Point Park. Experienced kayakers, ages 12+ (16 & younger w/ adult). 5-mile round trip paddle explores section of Gunpowder River. Fee: $13.

≋ *Birding By Boat:* 8:30–10 a.m. Sept. 28. Ages 8+ Search for early migratory birds. Fee: $10.

≋ *Down by the Bay / National Estuaries Day:* 12:30–2 p.m. Sept. 28. All ages. Hike along the edge of Otter Point Creek, a Bay tributary. Search for plants, animals; catch fish using a 100-foot seine net. Fee: $3.

≋ Spectacular Sunset Canoe: 5–7:30 p.m. Sept. 28. Ages 8+ Otter Point Creek. Bring a camera. Fee: $12.

≋ iNaturalist Trek: 1–2 p.m. Sept. 29. All ages. Search for plants, animals using the *iNaturalist* app. Help to collect information for the center's biodiversity data, learn how to use this program on other hikes. Free.

≋ *Nature Playgroup:* 9:30–10:30 a.m. Sept. 30 and Oct. 7, 14, 21 & 28 and Nov. 4. Ages 0–5. Stories, songs, simple crafts, discovery outings highlight a daily theme. Topics: spiders, migration, leaves, bats, deer, seeds. Fee for series: $42 per child.

≋ *Nature Tots:* 11 a.m.–12 p.m. Sept. 30 and Oct. 7, 14, 21 & 28, Nov. 4. Ages 2–3. Stories, songs, simple crafts, discovery outings will highlight each day's theme. Topics: spiders, migration, leaves, bats, deer, seeds. Fee: $42 per child.

Ages 12 & younger must be accompanied by an adult for all programs. Events meet at the center and require registration unless otherwise noted. Payment is due at time of registration. Info: 410-612-1688, 410-879-2000 x1688, otterpointcreek.org.

Irvine Nature Center

Upcoming events at Irvine Nature Center in Owings Mills, MD, include:

≋ *Tales & Tails:* 10–11 a.m. Fridays. All ages. Story, songs, puppet show, animal friend. Free.

≋ *Butterfly Week:* Sept. 7–15. All ages. Lepidopterologists (butterfly enthusiasts) can celebrate the extended hours in the butterfly house. Free.

≋ *Natural World of Science Drop-in Programs:* 10 a.m.–12 p.m. Sept. 14 (*Nature Bingo*); Oct. 6 (*Pumpkins Galore*). All ages. Mostly self-guided, programs may include crafts, hands-on exhibits. Free.

≋ *Day-off Camps:* 8:30 a.m.–4 p.m. Sept. 30 (*Nature Photography*); Oct. 9 (*Stewards of the Earth*). Ages 5–10. When school is out, explore the outdoors at Irvine: trail walks, nature games, crafts, stories, animal encounters. Wear nature-friendly clothing, bring a lunch. Fee: $85 (Aftercare, 4–6 p.m., is an additional fee). Info: explorenature.org.

≋ *Owl Prowl:* 7:30-9 p.m. Sept. 27. All ages. Search for owls on the trails. Meet the center's owls. Fee: $10.

≋ *Family Movie Night / The Lorax:* 7–9 p.m. Sept. 29. All ages. Outdoor theater. Free; concessions available for purchase.

≋ *Pumpkinfest:* 12–7 p.m. Oct. 12. Celebrate autumn with music, food, hayrides, alpacas, jugglers, face painting. Fee includes all activities: $5/ adults; $15/ child; free/ages 2 & younger.

≋ *Animal Caretakers Drop-off Program:* 10 a.m.–12 p.m. Sept. 21 & Oct. 5. Ages 5–10. Help animal care naturalists take care of Irvine's creatures. Fee: $25 per session.

≋ *Eat, Drink & Learn/ Downies, Hairies & Maraschino Cherries:* 6:30–9 p.m. Sept. 19. Adults. Learn about Maryland's seven woodpecker species, why they are extremely important to a healthy ecosystem. Dinner, drinks are provided. Fee: $60.

Info for programs: explorenature.org.

One last look is rewarded with an unexpected blue-headed vireo

By Mike Burke

The blue-headed vireo (Vireo solatarius) passes through the Chesapeake region during its annual migration. It can be spotted through October. (Brian McClure / CC BY-SA 2.0)

The sun was finally low enough that the heat of the day was starting to ease. We were just about to head home after a pleasant afternoon at the always popular Lake Artemesia Park in College Park, MD.

There had been resident Canada geese and migratory pied-billed grebes on the water. A great blue heron was looking for dinner near the shoreline. Swirling masses of tree swallows ignored the noisy Metro trains racing by. The usual assortment of blue jays and crows were raising a racket. Nothing out of the ordinary, and all of it wonderful.

Just before my wife, Pat, and I hit the road, I noticed a skulking bird in a nearby hedgerow. It was small, but bulky with a big head. Its bold white spectacles told me immediately that I was looking at a blue-headed vireo (*Vireo solatarius*).

The eponymous head was blue-gray with a thick black bill. A white horizontal streak atop the bill connected to white eye rings, giving the impression that the bird was wearing funky white-framed glasses.

The white of its chin extended underneath all the way to the tail. It had a mossy green back and two white bars on black wings. The sides were faintly yellow.

Males and females look similar, although the females tend to be a bit duller overall.

Blue-headed vireos don't live around here. The bird was just passing through on its annual migration. They tend to migrate south a bit later than white-eyed vireos. Like red-eyed vireos, you can find blue heads in the Chesapeake region well into October.

These vireos overwinter in a wide coastal area that starts around Norfolk and extends through the Carolinas and into the Gulf states, Mexico and Central America.

In early spring, these medium-distance migrants begin to appear in the Appalachian forests of Georgia. They quickly disperse across the eastern United States, including all of the Chesapeake watershed.

From June through late August, though, they can only be found reliably in the mountains of western Virginia, Maryland and West Virginia. Farther north, the breeding zone expands to include most of Pennsylvania and New York and up through the majority of Canada.

In Canada, blue-headed vireos usually nest in coniferous forests; farther south they also use deciduous forests.

On their breeding grounds, male blue heads pick out a nesting site, usually 5–15 feet above ground. His mate will quickly join him in nest construction before she takes over entirely to put on the finishing touches: lichen, spider webs and rootlets as a soft nest lining.

They will produce a single brood each year of three to six eggs (usually four). Both parents incubate, although the female appears to take all the overnight hours. When the eggs hatch about two weeks later, the chicks are helpless. Oddly, the male then takes over. He alone will feed his offspring during the next two weeks before the nestlings are ready to fledge.

Food during the summer is almost exclusively animal, mostly insects. They also eat spiders and snails. The protein in this food is critical to the growth of the chicks and to prepare the adults for the long journey home at the end of summer.

These birds forage for insects and their larvae in the top half of a tree's branches. It slowly moves along a branch, carefully inspecting for possible prey after every step. After a short hop or flight to a nearby branch, the methodical gleaning continues.

Although insects make up 95% of the blue-headed vireo's summer diet, fruits may account for 50% of its winter food.

The blue head is closely related to three sister species: the Cassin's, Plumbeous and Bell's vireos. All were once considered a single species called the solitary vireo. Clearer delineation of geographic separation and varied plumages, as well as critical DNA evidence, led to the split. The blue head kept the scientific name for the species, *solitarius*, while the other species were given new names.

Luckily, the nearly identical Cassin's vireo does not overlap with the blue head's range.

The bird I saw at Lake Artemesia was on its way south. Just like spring, the fall sees migrating blue heads spread across the watershed as they make their way to their other habitats.

While migrating, the blue-headed vireo is less selective about the landscape. It still prefers forest to field, but expansive tracts aren't necessary. As I had just witnessed, sometimes trees aren't even needed: A hedgerow will occasionally suffice.

It had been a lovely afternoon, and I had been deeply contented. And then, when I least expected it, there was this wonderful surprise: a final surfeit of beauty.

Sometimes the gifts of nature seem boundless. This was one of those times.

Mike Burke, an amateur naturalist, lives in Mitchellville, MD.

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The red-tailed hawk is often found in open areas perched on telephone poles or trees. (Mark Bohn/ U.S. Fish and Wildlife Service) Monarch butterflies, far right, caught on Poplar Island, MD,get tags before they are released to continue their southern migration. (Peter McGowan / USFWS)

Look up, look down: September's changes are all around

BY KATHY RESHETILOFF

Although the month of September can still hold some sultry days, wildlife throughout the Chesapeake Bay watershed is already receiving signals that autumn is coming.

Tree leaves have yet to change to warmer hues, but you'll catch small splashes of orange as the monarch butterfly, one of the few butterflies that migrates, begins a remarkable journey south. The monarch, found throughout the United States and into southern Canada, is easily recognized by dark orange wings with black veins and white edge spots. From September through October, millions of monarchs will flutter south to overwinter in the Gulf States and remote mountain valleys of southcentral Mexico.

Migrating monarchs often rest on narrow-leaved trees like willows, maples and pines before crossing bodies of water. Because of this, peninsulas are often good places to see these migrating butterflies. Point Lookout, Eastern Neck National Wildlife Refuge and Black Walnut Point in Maryland as well as Cape Charles and Kiptopeke in Virginia often attract monarchs.

Watch the skies and you are likely to see other migratory wildlife. Raptors — hawks, falcons and eagles — are also beginning their migration just prior to the fall foliage color change. Juvenile birds lead the way and are beginning to move in September. Adult birds generally wait until later in the fall to join the southbound flight.

As they approach the Chesapeake Bay from the north, some birds are funneled along the coast while the others are steered along the mountains.

Popular spots to see these raptors along the coast include Cape May, NJ; Cape Henlopen, DE; the barrier islands of Assateague, MD, and Chincoteague, VA; and all points south along the beaches to Cape Charles, VA.

To observe hawks flying along a mountain passage, travel toward the Appalachian or Blue Ridge ranges. The west-facing ridges in Pennsylvania, western Maryland and Virginia provide excellent opportunities to see the southbound migration.

Maybe not as obvious as migrating butterflies or skies dotted with raptors, a more subtle change can be observed in open fields, along roadways and near sunny river banks. Late-blooming wildflowers give us our last splash of color and provide a critical nectar source for pollinators such as butterflies and bees.

Many species of native goldenrods (*Solidago spp.*) and sunflowers (*Helianthus spp.*) dot the landscape with delicate yellow flowers. Meanwhile, the familiar black-eyed Susan (*Rudbeckia hirta*) creates patches and gold and brown. Native asters (*Symphyotrichum spp.*) sport a range of colors with their white, blue and purple petals.

Not to be outdone, native grasses and grasslike plants of freshwater wetlands and brackish marshes are also transitioning. As they begin to flower, these stands of summer green will change to warmer hues of gold, orange and reddish brown.

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

Seaside goldenrod grows along the Atlantic Coast and in inland salt marshes. (R. Harrison Wiegard /Maryland Department of Natural Resources)