CHESAPEAKE
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Efforts strive to make outdoor spaces more inviting, accessible to all

≈ Variety of programs takes into account cultural differences and reflect diverse communities.

By Whitney Pipkin

When Kevin Bryan visits Rock Creek Park near his home in the District of Columbia, it reminds him of what's possible. He sees families from many ethnic backgrounds hosting barbecues and birthday parties at picnic tables. Dog walkers wind their way through wooded trails while cyclists "look like they are training for the Tour de France" as they hug the curves of the park's paved roads.

"People do use these spaces differently, and a lot of it depends on your background and the culture you came from," Bryan said. "But, if these lands are actually supposed to benefit all of us, we should figure out how to make that happen."

As lead coordinator for the Next 100 Coalition, Bryan is focused on ensuring that national park lands remain relevant for at least another century by appealing more equally to all Americans, especially those who are underrepresented in some public spaces.

Engaging more "minority stakeholder groups" in conservation and restoration efforts is a directive of the latest Chesapeake Bay Watershed Agreement as well. But the work to embrace a diversity

DIVERSITY CONTINUES ON PAGE 22

Many children at a RioPalooza event in July along the South Fork of the Shenandoah River took the opportunity to touch a catfish. The event catered to speakers of Spanish. (Alan Lehman, Potomac Riverkeeper Network)

MD Shore farms brace for latest phase-in of phosphorus rule

≈ One-year delay in regulation's phase-in under review as Lower Shore farmers warn of major impact; environmentalists want to know where excess poultry manure is being shipped.

By Timothy B. Wheeler

A much-debated farm pollution regulation is set to take wider effect soon in Maryland, stirring growing anxiety among farmers and environmentalists alike. Those concerns could put the rule on hold next year.

The state's Phosphorus Management Tool rule, adopted in 2015, aims to reduce the risk of polluted farm runoff by limiting how much manure farmers can use to fertilize certain fields.

Only about 100 farms have been affected so far, as the restrictions are being slowly phased in through 2022. But the number of farms that must comply with the rule is set to jump significantly in 2019.

Phosphorus, essential for plant growth, is one of the nutrients contained in manure. But when it reaches local waterways, it feeds algae blooms and worsens the fish-stressing "dead zone" that forms in the Chesapeake.

The Maryland regulation restricts or bars outright the application of phosphorus on fields where there's a risk that the nutrient will wash out of the soil into nearby streams and drainage ditches when it rains.

PHOSPHORUS CONTINUES ON PAGE 20

Virgil Shockley, who raises chickens and grain near Snow Hill, MD, called the phosphorus regulation "a potential disaster in the making" for farmers. (Dave Harp)

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Correction

In November's *on the Wing* column, there was an error that reversed the technique used by birders to distinguish between downy and hairy woodpeckers. The sentence should have read: "The hairy woodpecker's bill is long, extending forward about the same as the distance from the base of the bill to the back of the head. The downy's bill only goes about one-third of the way back."

An article in the November issue incorrectly stated that Cumberland County, PA, proposed using eminent domain to acquire land for a school. The Cumberland Valley School District made the proposal.

The *Bay Journal* regrets the errors.

Editor's Note

Our readers are the smooth finish after a bumpy start

It's been a tough year for the *Bay Journal*, and journalism in general. Around the world, the free press has been taking a beating. Our year started with the repercussions from an attempt by a political appointee — now gone from that position — to ax some of our funding because he didn't like what we wrote.

But for us, the year is ending on a high note. Our readership increased dramatically — more than 3,100 new readers in just the first nine months. And, we had an overwhelming response to the reader survey we conducted. We were delighted to learn that 72 percent of the nearly 4,000 respondents use the *Bay Journal* to inform conversations with others; 54 percent have adjusted their personal actions based on what they read; 22 percent have contacted an elected official about related topics; and 16 percent had volunteered for an event listed in our pages.

But we have more to do. We know from our survey that our readers want more than just the news — they want to learn about the Bay and its watershed. We're planning more reports that will help explain the region's ecosystem and put environmental news in context.

To further our commitment to fact-based journalism, we're planning to create a Science Advisory Committee. We want to make sure that we are regularly tapping into some of the region's best scientific minds and continually seeking feedback on our reporting.

This is part of a sustained effort to continue increasing our readership. At the end of October, our board adopted a goal to double our monthly readership to 200,000 in coming years. Achieving this will not only help create a more informed and engaged public, but also ensure a stable future for the *Bay Journal* — because readers like you make our work possible. Donations are increasing, and a third of the people who donated this year had never done so before.

But we are intent on keeping the *Bay Journal* free. We understand that not everyone can give financially; many of our readers are on fixed incomes. But they still give to the region through their actions. We strive to keep costs low so everyone can still get the *Bay Journal* — because every reader matters.

We'll be setting other goals in the future, including one to increase our presence in schools to help inform the next generation of citizens, scientists and decision makers about regional conservation issues.

You can help us achieve our goals:

- If you haven't yet made a donation, or are able to give an additional donation, please consider contributing when you receive our end-of-year letter.
- Help us to increase our reach. When you're done with your *Bay Journal*, pass it on to introduce us to new readers.
- If you represent an organization whose members would benefit from the *Bay Journal*, consider allowing us to mail a one-time sample issue to introduce them to the paper.

Thank you for your support this year, and we are looking forward to a brighter 2019.

— Karl Blankenship

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Clockwise from far left:

Otsego Lake in New York state is the source of the Susquehanna River. Learn how to explore its shores and the nearby village of Cooperstown on page 24. (Donna Morelli)

Little brown spots on this oyster are spat, or baby oysters. A VA commission's move to halt sales of spat to Maryland oyster growers is creating tension. See article on page 19. (Creative Commons Image courtesy of Mike Congrove / Virginia Institute of Marine Science)

Young Atlantic sturgeon are surging in the James River, raising cautious hope for species' "comeback." See article on page 11. (Matt Balazik)

WHAT'S INSIDE

Watershed forum celebrates diverse, innovative partnerships

BY LUCY HELLER

The first weekend of November marked the Alliance for the Chesapeake Bay's 13th annual Chesapeake Watershed Forum in Shepherdstown, WV. The event was a whirlwind of workshops, socializing, getting lost in the yellow, autumn forest and learning about what brings us all together under this year's theme, *Connecting Our Communities: Celebrating Diverse and Innovative Partnerships.*

In past years, the forum has opened with inspirational keynote speakers. This year put a new spin on things and the Opening Plenary included an interactive program by Jenny McGarvey, in the Alliance's Richmond office. The presentation focused on teaching the audience about the history and importance of the Chesapeake Bay watershed through varying forms of art. McGarvey's presentation included a dance video, watershed-related art exhibits, and a poem, which she read aloud.

Jeff Holland, the West and Rhode riverkeeper, showed off his musical skills with a celebratory song about chicken necking on the Bay. The interactive portion involved attendees using their own artistic abilities.

McGarvey taught us how to draw a cognitive map representing what we envision when thinking about the reason we got involved in the environmental field. The goal of the exercise was to help attendees connect with the broader picture of why we are working in this field, and remind us why we love the Chesapeake watershed.

From there, we all went our separate ways to find the workshops that best fit our interests and curiosities. The workshops were divided into seven different themes: organizational development; science and restoration; JEDI (Justice, Equity, Diversity, Inclusion); connecting communities; innovative partnerships; environmental education; and the Chesapeake Monitoring Cooperative.

The Chesapeake Watershed Forum at the National Conservation Training Center offered participants opportunities to learn, network and go outdoors. (Will Parson/Chesapeake Bay Program)

The amazing workshop leaders came prepared to lead 90-minute informative and thought-provoking programs. They inspired their audiences to learn more about building confidence in the workplace, as well as help younger attendees navigate what topics they would like to pursue in the future. One of my biggest takeaways from the forum was becoming aware of my personal responsibility of furthering Chesapeake restoration work, but that I wouldn't be able to do it without help from others — whether they are coworkers, community members, businesses or congregations.

The Chesapeake Watershed Forum in Shepherdstown, WV, had a wide variety of workshops to choose from. (Will Parson/Chesapeake Bay Program)

The Alliance and the U.S. Forest Service also announced the recipients of the 2018 Chesapeake Forest Champion Awards. They included Matt Keefer of Pennsylvania's Department of Conservation and Natural Resources Bureau of Forestry, who received Greatest on the Ground Impact; Jennifer Gagnon of Virginia Tech and the Virginia Forest Landowner Education Program, who was honored for Most Effective at Engaging the Public; and Rick and Kathy Abend, who were named Exemplary Forest Stewards. While the awards were specific toward Forest Champions, the winners provided inspiration for everyone to take local action to create a healthier Bay through environmental stewardship.

On the second day, the workshops ended with a three-hour field experience. Some of these workshops entailed exploring outside such as a tree identification class or a dairy farm tour. Other programs included *Making Pictures that Make People Care, Water Quality Monitoring 101, One-On-One Mentoring* and *Bay Journal: Reader's Roundtable.*

The field session led by the Chesapeake Collective really stood out, providing lessons on diversity, inclusion and privilege. We dove into conversations on not only what separates us, but also what brings us together. We learned how it can be easy to be blinded by our privileges and forget to notice our surroundings.

The Chesapeake Collective played a major role in helping the individual voices of the forum come together as one. The group had projects set up around the National Conservation Training Center campus that were made to foster a creative platform for diverse voices to express their vision and interest for a healthy watershed. Projects included observations with pictures that told people's stories, community boards, letter writing, art, and greater participation in projects such as the field session.

While we learned how to work better together by being more aware, we also learned to have fun together. In the evenings, there were opportunities for socializing and meeting new people, through mingle bingo (mingo), poster sessions, the bar, fireside chats and musical jamming.

The poster session included 51 posters by this year's Chesapeake Conservation Corps members and new professionals, as well as six posters from professionals. Winners for best poster included Corps member, Connor Lieu from The Nature Conservancy, and professional Alexander Reed from Washington County Division of Environmental Management.

Lieu's poster was on the Implementation of Standardized Red Spruce Monitoring Protocol in the Nature Conservancy's Western Maryland Preserves.

Reed wrote a storybook about the importance of our civic duty to not litter and to clean up after ourselves. Reed wrote in his poster abstract that he believes, "Using Art and Storytelling are two very powerful communication methods and can be used to explain the complex connections between environmental education and civic responsibility."

On Sunday morning, attendees had the opportunity to participate in a "forest bathing" exercise. Before our meditative walk, the exercise's leaders asked participants to write down something they wanted to think about while on the walk. I wrote, "to remember why I am here and to fully absorb my surroundings." Getting a chance to take a step back from the hectic pace of the forum and to fully embrace nature reminded me of the cognitive map exercise.

We all had separate reasons for attending the forum, but those reasons are what bring us together and that's why it is important to share and learn from others.

Lucy Heller is a Chesapeake Conservation Corps member in the Alliance for the Chesapeake Bay's Annapolis office.

New online tool shows climate change in Chesapeake watershed

County-by-county data show temperatures have been rising steadily in Bay region since 1980.

By Jeremy Cox

The planet has been warming amid a largely unchecked rise of greenhouse gas emissions. But what are the local effects of a changing climate? A new online tool developed by researchers at Cornell University in New York offers a year-by-year, county-by-county snapshot of those changes.

The interactive analysis focuses on the Northeast, so it incorporates much of the Chesapeake Bay's watershed — Delaware, Maryland, Pennsylvania, New York and West Virginia — but ignores Virginia and the District of Columbia.

Still, the website's centerpiece — a clickable map that enables users to find climate data ranging from 1950-2013 in each county — underscores that the vast majority of the watershed is getting hotter and rainier.

Just about all of the watershed's counties included on the map have experienced warmer annual average temperatures since 1980, according to the data Cornell used to develop its tool.

Some examples:

In Franklin County in southcentral Pennsylvania, the average annual temperature has risen at a rate of 0.3 degrees Fahrenheit per decade since 1950. But that rate jumps to 0.7 degrees when measured since 1980, suggesting things are getter hotter faster.

Increased precipitation is leading to more flooding and higher tides in some Chesapeake watershed communities. Here, high tide impacts a road in Cambridge, MD. (Dave Harp)

In Maryland's Prince George's County, the typical low temperature has warmed up a full 1 degree per decade since 1980.

In New York's Chemung County, average annual precipitation increased at a rate of 2.3 inches per decade from 1980–2013.

In Sussex County in Delaware, the typical daily high temperature ranged from 64 degrees in 1958 to 69.5 degrees in 2012. But the overall trend suggests it is increasing at a rate of 0.2 degrees per decade.

Worcester County in Maryland, home to the oceanfront resort of Ocean City, is adding more days with temperatures of 90 degrees and higher to its calendar. Three of the four years with the most days over 90 degrees have come since 2010.

The warming weather is giving farmers more time to grow their crops in most places. In Clearfield County in central Pennsylvania, farmers saw 164 consecutive days warmer than 32 degrees in 2013 compared with 133 in 1950.

The tool was compiled by Cornell's Department of Earth and Atmospheric Sciences and is geared largely toward giving farmers a local perspective on climate change. The researchers used data supplied by the university's Northeast Regional Climate Center.

The tool also includes temperature and precipitation projections in every county for each year out to 2099.

The tool's two models show the forecasts under high– and low-emissions scenarios. For example, the annual average temperature in Frederick County, MD, is predicted to increase from 52.6 degrees in 2013 to 60 degrees by the end of the century under the low-emission scenario or soar to 64.9 degrees assuming high emissions persist.

In other words, it's probably going to get warmer, but there's still time decide how hot it gets.

The tool can be found at climatesmartfarming.org/tools/csf-county-climate-change.

Is nonnative red alga a friend or foe? It all depends…

≈ *Gracilaria* can survive and provide habitat in areas where Bay grasses aren't found, but too much of it in other areas can choke off native species.

By Sarah Vogelsong

The reddish branches of Gracilaria vermiculophylla, seen here in Delaware waters, have spread through Virginia waters. Scientists say that, under certain conditions, the presence of this nonnative alga may be a boost for aquatic habitat. (© SA Krueger-Hadfield)

Any newcomer takes time to size up. And when one makes its entrance as slowly and subtly as *Gracilaria vermiculophylla* — a red alga native to the Pacific — did in the Chesapeake Bay, it can be even harder to determine whether its introduction will be helpful or harmful.

Today, as *Gracilaria* has become widespread in Virginia waters, questions continue to swirl around it. Scientists disagree over when the species came to the Bay, how it arrived and what its proper name should be. (In November, one group published a paper in the journal *Phytotaxa* proposing that it be reclassified as *Agarophyton vermiculophyllum*.) But even more significantly, scientists are wrestling with the thorny question of whether *Gracilaria* will prove a net positive or negative for the estuary.

"It's changing these habitats pretty fundamentally, and we don't understand the ecological or evolutionary impacts," said University of Alabama scientist Stacy Krueger-Hadfield, who has studied its presence in the Bay.

Unlike the microscopic algae generally associated with harmful blooms that lead to fish kills, *Gracilaria* is a marine macroalga, more commonly referred to as a seaweed, which can easily be seen by the naked eye. But unlike seagrasses, it lacks roots, flowers or leafy shoots. With red-hued, flexible branches that resemble those on a spreading tree, *Gracilaria* can easily be plucked from the waters by fishermen, foragers or birds in search of nest materials.

According to Virginia Institute of Marine Science Professor Romuald Lipcius, *Gracilaria* has been found in the Chesapeake as far north as Smith and Tangier islands and as far south as Virginia's Lower Peninsula. It has also spread midway up all of Virginia's rivers.

"I see that *Gracilaria* is actually here to stay," he said. "If anything, it could increase some more, but I think it's at a pretty high abundance right now, and I don't see that it's going to decline."

In much of the existing scientific literature, *Gracilaria* is said to have been introduced to the Bay in the late 1990s or early 2000s, although new work drawing on Eastern Shore herbariums by Krueger-Hadfield pinpoints its emergence to the 1970s, when she suspects it was brought in accidentally with oysters from three main sites in Japan.

"I honestly don't know how fast it's spreading, because I think it's been in places a lot longer than we're aware [of]," she said.

For some, the introduction of the macroalga has caused dismay. Beginning in the late 2000s, watermen around Tangier Island informed the Chesapeake Bay Foundation that they were seeing increasing masses of what they called "red moss" sometimes entangled in underwater grass beds. Locals also reported that those areas often seemed to have fewer crabs than others.

That's possible, said Lipcius: "In certain areas — for instance, in very protected coves and where there's little water flow — *Gracilaria* tends to bunch up." In these regions, where it can reach a thickness of 2 feet, the macroalgae block sunlight from reaching the seagrass below, leading to a die-off. That, in turn, can lead to declines in other aquatic populations such as blue crabs, which rely on these plants for both protection and the habitat they offer to species lower on the food chain.

While *Gracilaria* may pose a threat to the local ecosystem in areas where waters are slow or still, the alga appears to be having an unexpectedly positive effect in areas of the Bay where the water flow is more rapid, assuming the role previously played in many areas of the Bay by underwater grasses.

> *"It might have a positive effect if you look at one facet, it might have a neutral effect if you look at another and it might have a negative effect on another thing."*
>
> — Stacy Krueger-Hadfield, University of Alabama scientist

In those places, where there is less of a tendency for the plant to bunch up and block sunlight, Lipcius said, "*Gracilaria* is about equivalent to seagrass as a nursery habitat."

One of Virginia's foremost experts on the blue crab, Lipcius has been studying the effects of *Gracilaria* on this economically and ecologically significant species for the past decade. Ultimately, he has found that *Gracilaria* "has definitely played a role" in blue crab restoration and "may actually be keeping the population from declining."

In the past, juvenile crabs relied on seagrass beds for both protection and a source of food. As declines in the Bay's water quality led to great losses of these grasses (in 2008, the Chesapeake Bay Foundation estimated that half of the estuary's eelgrass had died since the 1970s), blue crabs were deprived of critical habitat, and their numbers also tanked.

Since then, improved water quality and restoration efforts have led to the regrowth of tens of thousands of acres of Bay grasses, reaching an estimated 105,000 acres in 2017. But rising temperatures from climate change may reverse some of those gains. Lipcius said that he believes that one key species, eelgrass "is likely to be extirpated" because of its difficulty surviving at sustained temperatures above 86 F (30 C); the more adaptable *Gracilaria*, which can thrive in temperate to subtropical temperatures, "could compensate for the loss of eelgrass to a large degree," he said.

Furthermore, *Gracilaria* has shown

ALGA CONTINUES ON PAGE 7

Alga from page 6

the ability to thrive in areas where seagrass has never grown — not just compensating for seagrass loss, Lipcius pointed out, but creating new areas where small crustaceans and other species can flourish.

It is because of this potential that Chris Moore, senior scientist for the Chesapeake Bay Foundation in Virginia, compared the macroalga to hydrilla, a nonnative underwater grass that was first observed in the Chesapeake Bay region in 1982 and within 10 years had spread over 3,000 acres of the Potomac. While hydrilla is not native, it has shown a predilection to grow in areas that previously lacked vegetation. Similarly, Moore said, *Gracilaria* may act as a "pioneer species" that creates conditions that allow native grasses to return.

While *Gracilaria* may be assuming some of the functions previously filled by seagrass, the two are not interchangeable. A 2017 VIMS doctoral study of the York River in Virginia, a sub-estuary of the Bay, found that juvenile blue crabs preferred seagrass to *Gracilaria* and that seagrass supported three times as many juveniles in their two earliest stages of growth. Furthermore, because the macroalga doesn't have roots, Krueger-Hadfield noted, it isn't able to stabilize sediments like seagrass or marsh plants such as spartina can.

A tube worm used pieces of Gracilaria vermiculophylla, a red macroalga or "seaweed," to build a shelter on a Virginia shoreline. The alga, native to the Pacific, has spread through Virginia waters but scientists aren't sure if it will help or hurt the ecosystem. (© SA Krueger-Hadfield)

"It might have a positive effect if you look at one facet, it might have a neutral effect if you look at another and it might have a negative effect on another thing," she said.

On one point, all researchers agree: To fully understand *Gracilaria*'s effect on the Bay, more research is needed. Krueger-Hadfield said that efforts are under way to assess the species' biomass within the Bay watershed, perhaps using drones, although Moore cautioned that such a task is especially complicated because of the difficulty of distinguishing *G. vermiculophylla* from other types of *Gracilaria*.

"There is some concern in making sure we have the right species," he said. "We're not always exactly sure what we're dealing with."

Nevertheless, the macroalga's sheer ubiquity in the Chesapeake is driving work forward.

"It's not going to be eradicated," Krueger-Hadfield said. "It's everywhere."

Sarah Vogelsong is a freelance writer based in Richmond, VA.

Cattle farmer uses down-to-earth practices to beef up the soil

≈ Cows help to filter water, sequester carbon and control invasive species during rotational grazing.

By Whitney Pipkin

The shaggy Red Devon-Angus and doe-eyed Jersey cattle surrounding Virginia farmer Matt Rales are more than the sum of their parts — though their meat will eventually be sold by the pound. To Rales, they are tools to tangibly address climate change, and he wants to prove they're up to the task.

Rales, who runs Another Perfect Day Farm with his fiancée, Abigail Fuller, has begun transforming the nearly 800 acres he purchased in 2016 into an ecosystem at peak performance: one that better filters water and sequesters carbon — and does so by feeding a growing herd of cattle.

The practice Rales uses is called rotational grazing. It entails systematically rotating animals through fields, often one small section at a time, allowing their manure to fertilize one area while the remainder rests and grows vegetation.

"We use the animals as a tool to create soil that can more effectively infiltrate water and cycle atmospheric carbon," the 34-year-old Rales said as he walked the animals toward their watering trough. "The byproduct of that is healthy, grass-fed beef."

A growing body of research suggests that this type of farming could help turn back the clock on climate change. Through photosynthesis and the development of deep root systems, the perennial grasses associated with the grazing system convert atmospheric carbon into soil carbon — pulling it from the atmosphere and storing it in the soil. They also promote water quality by reducing erosion and absorbing nutrients.

Matt Rales and his fiancée Abigail Fuller stand in a field verdant with perennial grasses in mid-July, two years after Rales bought the farm in Fauquier County, VA, where he's grazing cattle to improve the soil. (Whitney Pipkin)

Rotational grazing is not new to the Chesapeake Bay region. Nearly 200 grazers are listed in a regional directory of grass-based farms, and they have plenty of anecdotes to share about fields that no longer suffer from standing water or dry spots, as well as cows that no longer need dietary supplements. The Chesapeake Bay Program, the state-federal partnership that drives the Bay restoration effort, considers rotational grazing a nutrient-reducing best management practice.

But Rales is going further than most farmers in an attempt to document the benefits that many have reported anecdotally. He also wants to create a broader market demand for the services this type of farming can deliver to the surrounding environment.

Rales grazes a diversity of cattle breeds, moving clusters of them as many as four times a day at the peak of grass-growing season and allowing the rest of the farm's 800 acres to rest. (Whitney Pipkin)

One of the first things Rales did after buying the mix of pastures and former cropland in Virginia's Fauquier County was to take a point-in-time "snapshot" of its soil. He hired a company to extract 4-foot-deep soil cores at about 100 locations throughout the farm, collecting 88 data points from each of them. The Soil Information System study cost about $100,000, Rales said. The cost is one reason that Trimble Agriculture, which conducted the study, typically works with larger farming operations interested in applying costly fertilizers with precision.

Rales invested in the study for his relatively small farm because he believes that, "What gets measured gets managed." Knowing everything from the amount of water available to plants to the levels of calcium and carbon nestled beneath the grassy surface will help Rales to graze his cattle with precision, addressing each component of the soil's makeup to painstakingly improve it.

To accomplish the most progress in the least amount of time, Rales is applying what some might call an extreme version of rotational grazing. At the peak of grass-growing season this summer, he was shifting 300 head of cattle to fresh patches of grass — a feat that involves moving electric fencing and convincing the cows that he has greener pastures to offer — as many as four times a day.

This is where the soil study comes in handy. Rather than applying chemical fertilizers in response to some of the soil's trouble spots, Rales allows the cows to linger in a patch of land where invasive species are thriving, eating away at it over time.

In contrast, he moves the cows quickly through a place where soil compaction is a problem. As much as 99 percent of the farm's acres are resting while the cattle munch, fertilize and trample the remaining fraction. Done properly, this leaves behind a matted carpet of plant matter and manure-based nutrients that improves soil health over time.

Rales' intense engagement with animal agriculture, though driven by his interest in chipping away at climate change, was at first a surprise to his and Fuller's vegetarian and vegan friends.

What Rales and Fuller are doing "is turning the thought that 'animal agriculture is bad' on its head," said Aria McLauchlan, co-founder of Land Core USA, a Los Angeles-based organization that advocates for national and local policies promoting soil health. "They're doing so many things so well and so thoroughly."

McLauchlan said farmers like Rales make her work easier. She advocates

CATTLE CONTINUES ON PAGE 9

Cattle from page 8

for federal programs and market-based incentives that recognize how "regenerative agriculture" benefits more than the farmer's bottom line. The term refers to a system of farming principles, including intensively managed grazing, that increases biodiversity, enriches soil and improves watersheds.

A documentary filmmaker, Fuller is uniquely equipped for explaining their goals for the farm without getting too far into the weeds. At 32, Fuller is the youngest and only female director of Netflix's Emmy-nominated series, *Chef's Table*, having produced episodes on some of the world's top chefs.

"People always ask me if I'm actually farming," said Fuller, who moved to Virginia from Los Angeles about a year ago but still spends almost a third of her time traveling for work. "I move the cows with him and help out, but I'm more focused on growing the farm's communications and outreach."

For now, a majority of the farm's meat is sold through Hardwick Beef, an aggregator that sells online and to restaurants and shops around New York City. Responding to local demand, the couple has also started hosting pop-up sales in the District of Columbia, along with occasional tours of the farm.

Rales comes to agriculture with more experience — in both farming and business — than many others in their mid-30s. He knows how to interpret the soil test data, and he has plenty of ideas about how to fund a farm that's producing not only beef but also dividends for the environment. His recent purchase of the farmland is the culmination of years he spent studying how to manage animals in harmony with the environment.

Rales grew up in Potomac, MD, and earned a degree in environmental science at Middlebury College in Vermont. He worked with a business partner, Charles "Chuck" Kuhn, the founder of JK Moving Services, based in Sterling, VA, to purchase the pair of properties that comprise the farming operation.

Movable water troughs and fencing make Matt Rales' farming methods possible. He hopes to promote the idea that well-managed grasslands can sequester enough atmospheric carbon to reverse climate change. (Whitney Pipkin)

"I've come to the table with some capital. A lot of farmers today inherit the land, but that wasn't the case for me," Rales said. "Now, I'm trying to come up with strategies to help it make sense until we can get to the point that we're self-sustaining."

Farming is as much an intellectual exercise as a physical one for Rales. He learned the ropes of growing better grass during three years working for sustainable agriculture savant Joel Salatin at Polyface Farms in Virginia's Shenandoah Valley. He has also worked at farms in Zimbabwe, Botswana and California and run a "suburban farm" in Potomac, MD, serving some of Washington, DC's top restaurants, such as Komi and Marcel's by Robert Wiedmaier.

"More than anything, I spent a lot of time reading," said Rales, who liberally quotes Allan Savory, a Zimbabwe ecologist who popularized the idea that well-managed grasslands can sequester enough atmospheric carbon to reverse climate change.

Through photosynthesis and the development of deep root systems, perennial grasses can help combat climate change by converting atmospheric carbon into soil carbon. (Whitney Pipkin)

Rales and his business partner plan to enroll much of their 1,500 acres in conservation easement programs. The voluntary agreements, which compensate landowners in exchange for limiting the development or use of a property, would provide additional income to the farm.

But that's just one of the ways in which Rales aims to rely on more than beef sales for revenue. He also hopes to monetize the work the farm is doing for the environment by receiving payments for the "ecosystem services" it provides.

In an ecosystem services market, businesses or jurisdictions pay landowners to develop or preserve features and practices that benefit the environment to offset the impact of pollution elsewhere.

One way in which Rales might receive ecosystem services payments is to participate in Virginia's wetland mitigation program. Federal and state rules encouraging "no net loss" of wetlands have fueled a growing market for mitigation banks that developers pay into when it's not possible to avoid removing wetlands elsewhere.

Looking down from the pasture onto one of two streams that run through Another Perfect Day Farm, it's easy to see the potential. A sprawling floodplain below could be turned into a wetland, Rales said, measuring between 85 and 120 acres. But he is still conflicted about the idea.

"From a financial perspective, we'd have more income [from the wetland restoration] to develop a larger grazing operation that can positively affect the land," he said. "But, at the same time, you're sort of taking this land — that, in my mind, we could be improving in an even more dramatic way — out of commission."

This coming year, possibly in the spring, Rales will test his hunch that grazing cattle could be the land's best use by running another sweeping test of the soils. Two years into the operation, a scoop of earth already comes with signs that it's improving: long roots that are penetrating deeper into the ground, and more dung beetles, earthworms and fungi.

One pasture that had been resting in late summer was a picture of diversity, dotted with Queen Anne's lace, black-eyed Susan, Indian grass and the occasional monarch. But, for all of these things, that picture still can't tell us about the soil, Rales hopes the data will do the talking.

Elusive Eastern black rail proposed for federal protection

≈ Marsh bird's low-lying nests increasingly devastated by sealevel rise, tidal flooding.

By Karl Blankenship

The diminutive Eastern black rail, an elusive marsh-dwelling bird that has nearly disappeared from the fringes of Chesapeake Bay marshes in recent decades, may soon turn up someplace new: the federal list of threatened and endangered species.

The U.S. Fish and Wildlife Service has proposed listing the bird, whose population has been in sharp decline all along the East Coast, as threatened under the Endangered Species Act.

A threatened listing means the bird could become endangered throughout all or a significant portion of its range in the foreseeable future.

"We have determined that habitat loss and destruction, sea level rise and tidal flooding, incompatible land management, and increasing storm intensity and frequency are the primary threats to this subspecies," the service wrote in its proposal.

Black rails have been losing ground for a century as the wetlands they depend on have been drained or developed. In recent decades, though, the birds have increasingly been squeezed out as their nests are more frequently inundated by storms and unusually high tides driven by a rising sea level.

The sparrow-sized birds — which are the smallest members of the rail family — are already listed as endangered in Maryland, Virginia, Delaware, New York and several other states along the Atlantic Coast.

A bird bander holds a black rail. The total number of breeding pairs along the Atlantic Coast is estimated to be between 355 and 815. (Whitney Wiest / U.S. Fish and Wildlife Service)

Recent surveys by the Center for Conservation Biology in Virginia and the Maryland Department of Natural Resources have found that black rails have nearly disappeared in Virginia and their numbers have declined by 90 percent in the last quarter century in Maryland, where only a handful are found today.

As recently as the early 1990s, the black rail was one of the most common species of rail found in Bay marshes. Birders from around the world visited Elliott Island in Maryland's Dorchester County to hear the nocturnal birds — they are rarely seen— but they have not been reported there in years.

"The population is in tremendous trouble right now," said Bryan Watts, director of the Center for Conservation Biology, a research organization. "It has experienced catastrophic declines and range contraction, and that is ongoing. It is declining so fast that is it hard to even really know where we are in that free fall at this point."

Watts was the author of an exhaustive 2016 literature review documenting the status and trends of the black rail going back more than 100 years. His report was among those used by the service in making its recommendation.

Black rails have already disappeared from New England, and the service said the number of breeding pairs along the remainder of the East Coast and the Gulf Coast of Florida was between 355 and 815. The service predicts continued declines in those areas in coming decades.

Black rails forage for invertebrates, such as water beetles, in areas that have wet soil or even a thin covering of water. (Woody Woodrow / U.S. Fish and Wildlife Service)

The population is in its the best shape in coastal Texas, where about 1,300 black rails were found prior to Hurricane Harvey last year. But the hurricane hit important habitat areas for the birds and likely caused mortalities because it struck while recently hatched birds were still flightless, the service said.

The black rails' dependence on a thin strip of shallow water habitat near the upper edge of the tidal marsh makes them particularly vulnerable. Their nests are built in clumps of vegetation that are more frequently flooded as the sea level rises and storms become more intense. Local populations can survive occasional floods, but the nests are being drowned more often — eggs along with them — and the birds are disappearing.

The birds can adjust by moving upslope but, because marshes are relatively flat, even a small amount of rising water can push them out of suitable habitat toward trees, roads or stands of invasive phragmites.

There may be plausible options to save the black rails, Watts added. While the birds are mostly found in salt marshes, they will use freshwater wetlands if they have the right conditions — they were once found in parts of the Midwest and Great Plains, though those populations have largely disappeared.

Watts said that scientists could try creating nontidal wetlands with suitable conditions in areas near lingering black rail populations to see if the birds would move in. The process would likely take some trial and error, he said, because no one knows the exact habitat conditions required by black rails as they are nocturnal and live in shallow marsh areas that are hard to access at night.

"There is some promise that if we can get the recipe right, we might be able to manage the population in nontidal areas and that would open the door for us to be able to control the habitat much more effectively and hopefully grow the population," Watts said.

He also said it might be possible to modify waterfowl management ponds in some places to attract black rails.

The species was petitioned for listing in 2010 by the Center for Biological Diversity, an advocacy group based in Tucson, AZ, which praised the service's recommendation.

"We're relieved that this fascinating and secretive bird is getting the protection it desperately needs to survive," said Stephanie Kurose, an endangered species specialist with the organization. "For too long we've been plowing and paving over wetlands that not only provide crucial habitat for the survival of rails and thousands of other wildlife species, but also protect us against flooding and clean our water."

She added that the black rail is "yet another example of all that we stand to lose if we don't do more to curb emissions and curb climate change."

The service has to make a final decision on the proposal by Dec. 10, 2019. If the species is listed as threatened, the service could prevent activities such as fire management, haying and mowing in areas where the birds are known to be found during nesting and breeding seasons as well as post-breeding flightless molt periods.

The decision would not affect a separate black rail subspecies that is found in California.

Young Atlantic sturgeon numbers surge in the James River

≈ Recent discoveries of the juvenile fish stir hope for the species' comeback

By Sarah Vogelsong

All of the juvenile sturgeon found in the James River this year were in the 6–11 centimeter range and classified as "age 0," meaning they were likely just a few weeks old. (Matt Balazik)

A bumper crop of juvenile Atlantic sturgeon in the James River this fall is raising some environmentalists' hopes that the endangered fish may be staging a steady comeback in Virginia's largest river.

"We're starting to see real momentum to see a species come back, but also a river come back," said Jamie Brunkow, riverkeeper for the James River Association.

This fall, as of Nov. 12, 153 juvenile sturgeon had been discovered in the James during routine trawling surveys — a staggering increase over last fall's yield of just two.

Of those, 148 have been caught by Virginia Commonwealth University's Rice Rivers Center; 40 of them captured on Nov. 5 alone. All of the center's catches were made between the Benjamin Harrison Bridge near Hopewell and Sturgeon Point, which sits just west of the Fort Pocahontas historical site in Charles City County. The five juveniles turned up by the James River Association were found in mid-October during an education program at Presquile National Wildlife Refuge.

While the finds have sparked excitement among environmental advocates and researchers — Brunkow called the discoveries "extraordinary" even when the count sat at nine — some are urging caution in claiming a restoration success.

"It is exciting, but it's still too early to call it for me," said Matt Balazik, a scientist with Rice Rivers and the U.S. Army Corps of Engineers who specializes in Atlantic sturgeon in the James. "These guys have a long way to go before I'm comfortable with [the rate of juvenile] recruitment."

Overfished in the Chesapeake region almost to the point of collapse in the 1800s, Atlantic sturgeon (*Acipenser oxyrinchus*) have been slowly returning to the Bay watershed over the last decade. But in the James River, where researchers have identified and tagged more than 700 adults, juveniles have largely been absent until recent years.

"We seem to have a recruitment problem in the James River of fish surviving when they're young," Balazik said.

Researchers aren't quite sure why juveniles have been so scarce in the James. Some suspect predation by other fish, such as the nonnative blue catfish, may be decimating the ranks of the young. Disappearing habitat may also play a role: For spawning to occur successfully, sturgeon need a hard, rocky river bottom for eggs to adhere to, as well as water with low levels of sediment and high dissolved oxygen content.

Other risks include vessel collisions, the dredging of spawning areas and water intakes at industrial plants.

Although it was clear that juveniles must exist somewhere in the James, none were found by either fishermen or research trawls until November 2016, when three turned up. The next year, two more emerged.

All five of the earlier juveniles, though, were older than this year's discoveries. The two 2017 finds were 47 and 52 centimeters in length, respectively, while the 2016 juveniles were all less than 43 centimeters in length. Based on their measurements, Balazik estimated them to be about a year old.

In comparison, all of this year's finds were in the 6–11 centimeter range and classified as "age 0," meaning they were likely born within the last few weeks around Osborne Landing, where a number of tagged female sturgeon have been detected.

Juveniles ages one to two years "are the ones I really love catching, because those are pretty much safe at that point," Balazik said.

Mere weeks old at the time of discovery, the 153 juveniles are not assured of reaching maturity, and they are too small to be equipped with tracking devices that could help researchers learn more about how the fish live and grow in the James.

Both Brunkow and Balazik speculated that the high incidence of juveniles this year may be due to the heavy rains that affected the entire James River watershed this summer and fall. Sturgeon move upriver to spawn, and the juveniles move slowly downriver as they grow. Researchers at the Rice Rivers Center no longer conduct trawls above the fall line, though, because of the high incidence of snags their equipment encounters upstream.

"It's a good chance in a normal year they're up there, but maybe with the stronger flows, maybe they came downstream a little more quickly," Balazik said.

While Balazik is tempering his excitement until next year, when researchers can get a sense of how many juveniles survived their treacherous early months, Brunkow sees the finds as a hopeful signal of water quality improvement.

"The sturgeon just happens to be our local mascot here in the James," he said, and this year's juveniles offer "some reason to be excited and positive about the future."

Sarah Vogelsong is a freelance writer based in Richmond, VA.

Spotted lanternfly, a dire threat to crops, shows up in MD

≈ Agricultural interests go on high alert for invasive Asian species that feasts on 70 different plants.

By Jeremy Cox

The spotted lanternfly, an exotic insect that feeds like a vampire on the sap of fruit orchards and hardwood trees, has been detected for the first time in Maryland, setting off alarm bells in the agricultural industry.

The Maryland Department of Agriculture announced Oct. 25 that it had found a single adult specimen in a trap in the northeastern corner of Cecil County, at the northern end of the Bay. The county borders Pennsylvania and Delaware, two states where lanternflies had previously been discovered.

Maryland officials said they are moving to stop the invasion in its tracks.

"It's something we're looking to do our best to keep our eye on," said Kim Rice, program manager for plant protection and weed management. "If we can eradicate it, we're certainly going to try."

A single adult spotted lanternfly. This invasive planthopper-type insect from China is known to cause damage to 70 plant species, including grapes, peaches, apples and hardwoods. Maryland agricultural specialists are asking citizens to report any sightings of the insect. (Lawrence Barringer / Pennsylvania Department of Agriculture, Bugwood.org)

But Rice acknowledged that lanternflies (*Lycorma delicatula*) have several advantages working in their favor. The Asian imports have no known predators in the region and can expand into new areas by hitchhiking while in their egg stage on the underside of vehicles or train cars.

Allowing the invasive pest to claim even a toehold would be too much, Rice said, because of the risk it poses to agriculture. Lanternflies feast on 70 different types of plants and crops, including apples, peaches, oaks and pines.

And lanternflies may take a bite out of the state's wineries and breweries: Hops and grapes also are on their menu.

Doris Behnke is a University of Maryland extension agent based in Cecil County, and she owns a winery called Turkey Point Vineyard in the same county. The lanternfly has been on her radar since its first U.S. appearance in Berks County, PA, in 2014. When that state blanketed 13 southeastern counties in a quarantine last year, it was a "real eye-opener," Behnke said.

She quickly joined the chorus of Maryland agricultural officials and trade groups warning farmers and others to be on the lookout.

"It's a scary thing because there's no known control for it right now" beyond some insecticides that only appear to be effective shortly after lanternflies hatch, Behnke said. "They're not picky eaters. They attack trees and vines, and it doesn't have to be a certain time of year because they don't go after the fruit."

After the species' presence was verified in Virginia, Delaware and New Jersey, it seemed only a matter of time before Maryland joined the list, she said. In October, that's exactly what happened.

Behnke's vineyard is located on a family farm going back five generations. Growing grapes is already challenging enough in Maryland, with the unpredictable weather and recurring pests, she said. Now, she worries that a lanternfly invasion could set the industry back.

Since it's such a new threat, the full impact on vineyards and wine quality is "unclear," said Joseph Fiola, a University of Maryland grape expert, in a special industry alert in September before the lanternfly's presence was confirmed. But he warned that damage from feeding coupled with winter cold stress could kill vines.

As adults in the summer, lanternflies hop from leaf to leaf, using a strawlike mouth to extract sap from tree bark and plant stems.

"It's like draining the gas tank," Behnke said. "Once they drain that gas tank, depending on the time of year, there's a point that the plant, tree or vine can't build up that energy anymore."

Their victim of choice is a fellow Asian invasive, the tree of heaven *(Ailanthus altissima)*. During the winter, lanternflies slather the trees with masses of eggs that resemble brownish-gray splotches. But they're not too picky about this either, often resorting to any smooth surface. Experts suspect that the first lanternflies to reach North America hitched a ride on a shipment of stone from their native China.

Spotted lanternfly adults (winged) and fourth instar (last nymph stage before adult form) feed on a tree of heaven (Ailanthus altissima), an invasive tree from China. All stages feed on trees, shrubs and vines and cause damage, but for unknown reasons, the insect must feed on the tree of heaven to produce viable eggs. (Emelie Swackhamer / PennState Extension in Montgomery County)

But they are perhaps best known — and despised for — the sticky, sweet fluid they excrete. Referred to as "honeydew," the lanternfly's excrement has been known to cover park benches, patio furniture, children's play equipment and other surfaces. The goop also invites the growth of a sooty mold that can get so thick that it blocks a host plant's access to sunlight, Behnke said.

The bugs themselves look like demonic butterflies. Measuring an inch long by a half-inch wide, they have large, colorful wings. The front set tends to be beige with block dots. The back wings are two-tone — scarlet with black spots at the bottom while striped in black and white at the top.

Maryland and U.S. agricultural officials have set up 15 traps at strategic locations along the state's borders to monitor the lanternfly's movements. But they're not sure whether any regulatory actions will be needed until a fuller picture of its whereabouts emerges. A quarantine like the one in Pennsylvania would limit the movement of plants and outdoor household items out of the affected area.

"We don't know what we have yet," Rice said.

The lone captured insect was a male, so it did not produce any egg masses, she added.

In the meantime, officials are imploring the public to collect any lanternfly adults, nymphs or eggs they might find and report it at DontBug.MD@maryland.gov. The insects should be placed in a plastic bag and frozen to kill and preserve them.

Banned pesticide still in some MD stores, spot checks show

≈ Law barring consumer sales of neonicotinoids for outdoor use took effect Jan. 1.

By Timothy B. Wheeler

Maryland's pioneering law to restrict the sale and use of insecticides implicated in honeybee die-offs had a bumpy debut this year. Spot checks of home and garden, hardware and other stores around the state found some of them still stocking bug-killing products that should have been removed from retail shelves.

The Pollinator Protection Act, passed in 2016, made Maryland the first state in the nation to adopt legislation aimed at keeping consumers from using neonicotinoids, a widely used class of insecticides that some studies have linked to steep population declines of bees and other pollinators. At least eight other states have adopted different legislation aimed at protecting pollinators from pesticides.

Maryland's law, which took effect Jan. 1, effectively bans all consumer bug killers containing neonicotinoids if intended for outdoor use. Only stores with state permits to sell restricted-use pesticides may carry those products, and they must be kept behind the counter. They can only be sold to state-certified pesticide applicators or farmers, who are exempt from the ban.

The law also exempts neonicotinoid-containing flea and tick repellants for pets, lice and bedbug treatments as well as other indoor insecticides, including ant baits. Neonicotinoid class pesticides include those with the following active ingredients listed on the product labels: imidacloprid, nithiazine, acetamiprid, clothianidin, dinotefuran, thiacloprid, or thiamethoxam.

Activists who successfully campaigned for the law's passage say they discovered to their dismay that at least some banned products were still being sold to consumers throughout this year's growing season.

"We started hearing about this in the spring, in the bee club meetings," said Bonnie Raindrop, legislative chair for the Central Maryland Beekeepers Association.

So, she and six other volunteers visited 30 stores from May to October and found products that should have been removed from shelves in 11 businesses in the Baltimore and Washington metropolitan areas. The products, many of them listing the neonicotinoid imidacloprid as an active ingredient, were on sale in locally owned nurseries as well as in outlets of several national retail chains that sell gardening supplies.

The Pollinator Protection Act, passed in 2016, made Maryland the first state to adopt legislation aimed at keeping consumers from using neonicotinoids, a widely used class of insecticides that some studies have linked to steep population declines of bees and other pollinators. (Dave Harp)

In a number of cases, Raindrop said, they took photos of the products on display. And in some instances, they spoke to store managers or clerks.

"I've taken bottles off the shelf and taken them up to an employee or a manager, and said, 'You really need to stop selling this stuff — it's illegal,'" said Steve McDaniel, a master beekeeper in Carroll County who participated in the volunteer spot checks.

But not all store personnel responded positively when confronted, said Ruth Berlin, executive director of the Maryland Pesticide Network.

"They said, 'So what? It's OK. No one's going to make us take it away,'" Berlin said. The volunteers' findings, she said, were reported in late summer to the Maryland Department of Agriculture, which regulates pesticide use in the state.

Dennis Howard, the MDA's manager of pesticide regulation, said the law's language can be a little confusing, but it does prohibit sales to the general public of neonicotinoid pesticides for outdoor use.

"They should be behind the counter," he said, "for the folks who can actually apply it under the legislation."

Howard said that enforcement of the law has been hampered because his office has been short-handed lately. He explained that he's only had five of the seven inspectors he normally has to check on hundreds of businesses statewide and respond to consumer complaints. But after speaking with Berlin, he said, he directed the staff he does have to "beef up" their checks for neonicotinoids.

"I told the inspectors to try to do as many as they can," he said, "… and speak to the managers of stores, so sales people won't let [consumers] purchase it."

Howard said two of his inspectors did find stores still selling products that shouldn't be available to consumers. They were advised to remove the items from the shelves, he said.

Berlin said she realizes the state may lack the staff to get around to all stores, and she said she offered to continue reporting what volunteers find. "We're trying to collaborate," she said.

But she noted that the law provides for a $250 fine for a first offense, going up to $500 for a repeat infraction. Fining a few retailers, she suggested, might send a message to the rest to pay attention and follow the law. And it might help, she added, if retailers got a letter in advance of the 2019 growing season, reminding them that it's illegal to sell outdoor neonicotinoid pesticides to untrained consumers.

Beekeepers have been experiencing severe losses of their colonies for more than a decade. Scientists attribute the die-offs to a variety of factors, including mites, disease, lack of adequate nutrition and habitat loss. But a number of studies — though disputed by chemical manufacturers — have suggested neonicotinoids also could be involved.

Neonicotinoids disrupt the central nervous system of insects, and some studies have found evidence that even sublethal exposure to the chemicals can affect bees. Their widespread use in agriculture as well as home gardening has led to their being detected in 59 percent of streams sampled nationwide, including the Chesapeake Bay watershed, according to the U.S. Geological Survey.

"Most people, they really feel like because we got the law passed, we're out of the woods on bee deaths," Raindrop said. "What we're seeing is a trend that's getting worse."

In a nationwide survey released in May, beekeepers reported losing 40 percent of their hives on average last year, up from 33 percent the year before. In Maryland, the average annual loss was even higher, at 49 percent.

McDaniel, the Carroll County beekeeper, said he lost all but three of his 26 hives last year, and many other keepers he spoke with saw more than half of their colonies die off.

McDaniel said he has been willing until now to give store managers the benefit of the doubt, because they may not have gotten the word about the new law. But with beekeeping being so challenging these days, he said his patience has limits.

"If they're still carrying it next spring," he said, "we're going to come down on [them] with both feet."

Months after storms, Chesapeake debris cleanup presses on

≈ Crews remove navigational hazards washed into waterways during floods.

BY JEREMY COX

A half-submerged tree trunk bobbed in the waters of the Chesapeake Bay.

From his perch several hundred feet away aboard a small barge, John Gallagher began giving orders to his crew. Not much needed to be said. By now, the actions of the other three men had become almost automatic.

"Here's a good example of what the debris looks like in here," said Gallagher, head of the Maryland Department of Natural Resources' hydrographic operations. "This is right off the channel."

Chris Ruark steered the boat close enough for Aaron Nelson and Matt O'Neal, both clad in hard hats and orange life jackets, to fit a pair of large tongs around the waterlogged tree. Then, they reeled it into the boat's hull using a crane mounted on the side of the vessel.

Then it was on to the next navigational hazard.

And the next.

So it went for Gallagher's small enterprise as it chipped away at a big assignment: making the Bay safe for boating after a summer of epic rains flushed untold amounts of debris into its waters.

As of Sept. 27, DNR crews had removed 140,680 pounds of storm-related debris from navigable waters in the Bay. But the work was far from done. Gallagher said he expects the cleanup to continue, after a winter intermission, well into 2019.

Matt O'Neal, a hydrographic engineering associate with the Maryland Department of Natural Resources, right, uses a remote-controlled crane to place a tree trunk into the agency's vessel, the R.P. Gaudette. He is assisted by Aaron Nelson. (Jeremy Cox)

The U.S. Army Corps of Engineers also has pitched in, but its boats largely concentrate on the federally maintained channels immediately around the Port of Baltimore and District of Columbia. That leaves the DNR with the balance of the Bay's navigable Maryland waters as well as many of its many tributaries.

This year is on track to rank as one of the wettest ever recorded in the mid-Atlantic. As of Nov. 5, Baltimore had been inundated with 59 inches of rain, according to the National Weather Service. Since 1871, when record-keeping began there, just two years have witnessed more rainfall — and those totals were based on the entire 12 months.

When rain turned heavy this year, especially in July, it sent torrents of stormwater across the land into ditches and streams, down rivers and eventually into the Bay itself.

Most media reports about the long-range impacts have focused on the tons of nutrients and sediment flushed into the Chesapeake. The waters at the mouths of several rivers, including the Susquehanna and Potomac, temporarily turned the color of chocolate milk. Scientists worried that the sediment would block sunlight from reaching underwater grass beds and that nutrients would fuel alga blooms that trigger oxygen-starved "dead zones."

Matt O'Neal holds onto a waterlogged tree while Aaron Nelson, a hydrographic engineering associate with the MD DNR, cuts into a tree found floating in the Bay near Pasadena. (Jeremy Cox)

But the rushing water also carried large pieces of debris, such as fallen trees and everyday garbage. While less troubling to the Bay's health, the flotsam represented a major headache for boaters, shoreline communities and waterfront homeowners.

People like Archie Hall.

Hall, 82, has lived in the Bayside Beach subdivision in Pasadena for 30 years. He has never seen as much debris in the Bay as he did this year, he said. By late October, when Gallagher and his crew tied up at his dock, most of it had been picked up by neighbors or floated away.

"It was four times this bad, floating in and out," Hall said. "What's left is stuck on a rock or floating on a pier."

Debris removal involves some triage, Gallagher said. His top priority is snagging anything that poses a threat to boat safety in channels, the main thoroughfares for watercraft. Then comes anything outside the channels that could float back that way with the wind and tide.

In normal times, the hydrographic operation busies itself with placing buoys, removing abandoned boats and piloting the state's three icebreaker boats in the winter. The last few months have not been normal times, though.

Gallagher said his crews removed 10 boatloads of debris alone from Lake Ogleton, an anchorage off the Severn River. They also spent considerable time in the Middle and Chester rivers.

The majority of the material has consisted of tree limbs and trunks. But there have been oddities, including an industrial chlorine tank and a giant tire from an excavator, Gallagher said.

The tire has been repurposed as a piece of workout equipment at a gym, but there is no recycling for the rest of the debris. The trees can't be ground into mulch because they sometimes contain metal shrapnel, which damages the state's tree chippers.

Usually, the DNR boats haul their quarry to Kent Island, where it is loaded onto dump trucks and taken to a landfill in Ridgely. A boat loaded with 5,000 pounds of debris can't go very fast or else it risks getting swamped. So to save time during Western Shore cleanup jaunts, the Army Corps has begun making available its drop-off site at Fort McHenry.

Gallagher said that once a piece of debris has lodged itself safely on land, it's out of his division's hands. But he immediately decided that the once-towering tree trunk in front of Hall's home had to go. It was wedged onto a stone jetty but still partially underwater — free perhaps to catch a ride on a future high tide.

In a flurry of sawdust and flying water, Nelson used a chainsaw to cut the trunk into three pieces. O'Neal moved the levers of a remote control to lift the chunks into the 36-foot aluminum boat, dubbed the R.P. Gaudette.

Just as the last piece dropped with a thud, something went wrong. A few puffs of smoke boiled up from the crane's engine. After a few minutes of tinkering, the men decided they would have to retrieve a replacement part from the Army Corps.

As their boat slowly gathered speed out in the open water, the sunlight sparkled on the surface, showing no obstacles in their path.

Proposed townhomes on VA floodplain draws opposition

≈ Some say revitalization would be an improvement, others worry about precedent for future development.

By Whitney Pipkin

A vacant trailer and spray-painted "no parking" sign in Alexandria, VA, have long made the gravel lot where they're perched look forgotten. But a plan to redevelop the 8-acre site at 8800 Richmond Highway — which sits squarely in the floodplain of a Potomac River tributary — is garnering plenty of attention and lively debate.

A Northern Virginia developer wants to build 43 townhomes on the property that is considered one of the thoroughfare's biggest eyesores. Supporters say the project aligns with Fairfax County's broader vision for redeveloping a more than 7-mile strip of the timeworn corridor.

But doing so would require exemptions from state and local laws intended to prevent flooding and protect water quality in the Potomac River and Chesapeake Bay. The project site cozies up to Dogue Creek, a flood-prone suburban stream that drains the parking lots and roofs of a 1980s-era neighborhood as well as military facilities. The creek flows into the Potomac near George Washington's historic Mount Vernon estate.

The Chesapeake Bay Foundation and Audubon Naturalist Society — groups that don't typically get involved in smaller development disputes — are among a half-dozen regional groups opposed to the project, which they say would set a worrisome precedent in Virginia's most populous county.

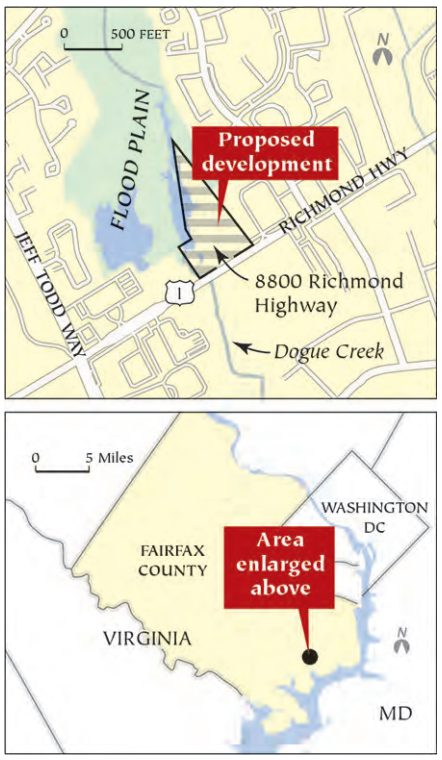
"We think there is a way to address and further revitalization as well as these environmental programs," said Peggy Sanner, the CBF's Virginia assistant director and senior attorney. "And that is to respect what's in the [county's] comprehensive plan, which is that you should not be building next to the stream valleys."

Pete Sitnik, who inherited the property with his two siblings in 2008, said his family needs to sell the three parcels that make up the property, one of which carries an annual tax bill of about $18,500. He sees the townhomes as fitting with a broader vision for the corridor, one with higher-end residences that are able to support improved retail options. He said he's willing to donate a portion of the property to the county, but giving it all away is not an option.

"Could you donate your 401(k) or your house to somebody, and have no other income?" asked Sitnik, who is 67.

Opponents of the project point to the recent severe flooding in Ellicott City, MD, and in Texas and North Carolina after massive storms as evidence of what's at stake when municipalities build in floodplains. The water, they say, has to go somewhere, and stronger storms coupled with a rising sea level are already exacerbating flooding in streambeds.

Dogue Creek was funneled into this culvert in the 1950s when the Sitkin family that owns the property first constructed a small amusement park and roads on site. After its watershed became more developed, the creek was diverted to form a new channel, which swelled with water one Friday in mid-November after the season's first snow. (Whitney Pipkin)



Lucidity Information Design, LLC

Stewart Schwartz, executive director of the Coalition for Smart Growth, said his organization supports the redevelopment of the area and its transition toward a greener, more walkable corridor. But building townhomes in a floodplain, he said, doesn't fit with that vision.

"We have always been strongly supportive of redevelopment of parking lots as part of mixed-use development," Schwartz said. "But part and parcel of this is the conservation of our streams and natural areas."

In late October, the developer "indefinitely deferred" the project's hearing with the county planning commission a day before it was scheduled to take place. But Mark Viani, an attorney representing the prospective builder, Stanley Martin Homes, said that day the project is still "very much alive."

Besides, he said, "the issues we're presenting are issues we're going to confront up and down Richmond Highway."

Viani would know. He is president of the Southeast Fairfax Development Corp., a public-private partnership focused on marketing the Embark Richmond Highway renewal project. The big-picture plan entails widening the road to make room for bus transit and building clusters of residential units to break up the sea of storefronts. It also calls for returning buried Potomac-bound streams to the surface and applying modern stormwater controls to reduce polluted runoff.

Viani said he is working with stakeholders to see how the proposal for 8800 Richmond Highway could be tweaked to address environmental concerns while still leaving enough room for a viable development.

Conversations with county officials already led to increasing the proposed width of a section of vegetated buffer between the townhomes and creek from 39 feet to 89 feet, Viani said. But that still falls short of the 100-foot buffer required by the county-enforced Chesapeake Bay Preservation Ordinance, a regulation from which the project is seeking exemption.

Fairfax County has other provisions to deter development from occurring inside stream valleys and floodplains, and the county's environmental staff have so far been unconvinced by the developer's proposed alternatives, according to their reports. But the county's Office of Community Revitalization and some members of the Board of Supervisors — as well as some civic associations — still see the project as an opportunity to improve a property that isn't currently performing well at all, environmentally or economically.

"A lot of Richmond Highway has needs and challenges, and they will continue to be a negative for the Bay and the environment if we don't do anything," said County Supervisor Dan Storck (D-Mount Vernon), who represents the area and supports the project.

Backers of the project claim that it will deliver net environmental benefits for the creek and surrounding area. They say it will add streamside buffers where there aren't any, reduce hardened surfaces on the site and curb polluted runoff heading into the stream.

Concerns about increased flooding could be partially alleviated by the

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Multifunction stream buffers offer food for thought for PA farms

≈ Ability to plant cash crop may attract more participants but some question its effectiveness.

By Donna Morelli

Don English strode along the mowed path through his streamside buffer on Happy Hollow Farm in southcentral Pennsylvania with the confidence of an experienced tour guide. The tiny headwater stream of Deer Creek gurgled by, hardly visible in the tangled sprays of goldenrod and deep purple bergamot growing tall in the sunny spaces between larger trees and shrubs.

It was August, and monarch butterflies and bees were still flitting about. The blueberries were gone, and the elderberries were not quite ripe.

Stopping, he leaned on stacked beehives, pointing out the native trees and shrubs — about 80 species in all — and announced that the bees had collected enough pollen from the explosion of flowers here to generate 70 pounds of honey so far this year.

The 4-acre streamside buffer designed by his landscape architect wife, Ann, filters pollutants from stormwater and provides wildlife habitat. It also generates nuts, berries, honey and syrup — a bounty that could also deliver a financial return.

It truly is multitasking.

"When I designed [the buffer], I had never heard the term 'forest farming' before," Ann said. "When I did, I said, 'hey that's what we're doing.' "

Planting streamside buffers is an important strategy for improving water quality in the Chesapeake Bay region. These strips of trees, shrubs and grasses secure the soil, filter toxins and absorb nitrogen and phosphorus that would otherwise be carried into streams by stormwater.

On farms, though, planting buffers often means taking land out of production. In recent years, farmers have become increasingly reluctant to do so.

Pennsylvania is far behind in its Bay cleanup goals, and its catch-up strategy relies in part on planting 95,000 new acres of buffers by 2025. The state hopes to boost those plantings by promoting a compromise: buffers that yield a cash crop.

The state Department of Conservation and Natural Resources has put money behind the concept by including funds for "multifunctional buffers" in a grant program launched in 2017. So far, the program has helped fund about 350 acres of new buffers — both multifunctional and conventional — in Pennsylvania's portion of the Bay watershed at a cost of $1.6 million.

Don English surveys the streamside buffer that he and wife, Ann, planted five years ago on family land in southern York County, PA. The buffer, which contains trees and plants to protect water quality, also grows agricultural products— nuts, berries, fruit and flowers—that could be sold for a profit. (Dave Harp)

"Our program is sort of unique in the Bay region," said Tracey Coulter, the DCNR agroforestry coordinator. "We are embracing this idea, and we are funding it."

The idea is gaining interest. Various tour groups have been funneled through the Englishes' farm to see firsthand a mature and productive multifunctional buffer. DCNR staff and grant recipients account for some of the visitors, but Don said the largest groups have been members of the nonprofit Pennsylvania Association for Sustainable Agriculture.

The long-term goal is to entice more farmers to plant buffers, a critical step in reaching the state's 2025 goal.

Most buffer plantings on farmland are funded by the federal Conservation Reserve Enhancement Program, which provides annual payments for converting cropland to streamside buffers. But CREP participation has declined, in part because farmers are reluctant to retire cropland. CREP also prohibits generating income from buffers. With state support for multifunction buffers, which can still produce a harvest, advocates hope more farmers might plant buffers.

In the meantime, the multifunction concept is attracting a variety of landowners, and officials are tracking results.

"Right now we're trying to get buffers in the ground and we're documenting cost, growth and yields, if any," said Kelly Rossiter, the DCNR Rivers Program Specialist.

She said buffers might become more valuable over time because they could produce some crops, such as blueberries and elderberries, within a few years, and others, such as chestnuts, walnuts and hazelnuts, as they mature.

Surprisingly, the grant program was able to launch despite the legislature's consistent cuts to environmental programs. To do so, the DCNR partnered with the Pennsylvania Infrastructure Investment Authority, a pseudo-state organization known as PennVest, which manages revolving loans for water quality projects.

Executive Director Brion Johnson said the funds contributed to the grant program are an investment to help PennVest learn if the buffers can eventually produce enough revenue to pay back a loan.

"I am optimistic that it will pay off, but there is no data to support a business plan at this time," Johnson said.

Multifunction buffers may produce edible products and potential income, but their effectiveness at filtering pollution may be less than that of a conventional forest buffer.

Bernard Sweeney, a senior research scientist and former director of the Stroud Water Research Center in Chester County, PA, said that buffers lose some of the pollution-fighting power when they are partially planted with forbs or shrubs. He cited a 2014 study that looked at how well various buffers reduced the amount of toxins reaching waterways. Results showed that wider buffers generally removed more pollutants, and shrubs removed up to two times the amount of pollutants as grass. But trees removed up to three times as much as grass and shrubs.

"I personally would love to see at least 35 feet of canopy trees next to the stream with the crop trees providing additional width outside of that core buffer," Sweeney said. "However, life is a compromise and, if a narrower core of canopy trees is all that a given landowner can provide, then it is a good starting point that we can later build upon to get where we need to be."

The DCNR grant program provides more flexibility on buffer width and plant types than other state and federal programs to make it more appealing to more landowners. But the grant terms stipulate that buffers must be a minimum of 35 feet wide, with the first 15 feet planted with large tree species. The landowner must also commit to keeping the buffer intact for 25 years.

The research community is getting involved, too. In November, the Scientific and Technical Advisory Committee of the state-federal Chesapeake Bay Program partnership brought together scientists, farmers and nonprofit organizations to discuss multifunctional buffers. Lara Fowler, a Penn State Law School professor and STAC member said about 50 people came to the two-day forum.

"We recognize that Pennsylvania has such a heavy lift [in the Bay cleanup]," Fowler said. "Our goal is to put together a diverse group of people — farmers, scientists and nonprofits — to explore how we can accelerate planting more multifunctional buffers toward Pennsylvania's goal of 95,000 more acres."

Only about half of the projects funded to date are on farms. Most of the interested landowners tend to own smaller parcels or have an educational mission — like one municipality planting a food forest in Lancaster County. Others include Amish farmers who may be looking for a modest financial return from the planting, and families like the Englishes, who have full-time jobs elsewhere and consider the buffer

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state's plans to replace a section of highway that floods regularly with an expansive bridge. That would create more room for the creek to flow in its natural channel.

But, even if that fix doesn't come to fruition, Viani said, Stanley Martin plans to build up the land under the proposed townhomes to "raise it up out of the floodplain." Some neighbors, worried that flood waters might be transferred to their downstream properties, are unconvinced.

The Sitnik family has owned the property since the 1950s — briefly running a small amusement park there — and has seen firsthand how unpredictable Dogue Creek can be. In the 1980s, the forested area where they had once run a small park train around a manmade lake became a wetland when development upstream changed the creek's dynamics. Soon, the family donated the more than 15 soggy acres to the county.

The Sitniks and Stanley Martin Homes see development of a runoff-prone portion of the remaining acreage as both a solution and improvement.

"We pay a lot just to keep this property as is, and we can't do that," said Sitnik, who considers developing the commercial-zoned section of his property into a strip mall as his next-best option. If this project doesn't pan out, "we're going to have to take a low-ball development of some sort."

The townhomes project is contingent on the county granting a rezoning request to allow up to eight residential dwelling units per acre. That request will likely face plenty of opposition if it proceeds, in part because of its broader implications: Developers wanting to build in floodplains elsewhere could cite this decision as a precedent.

Alan Rowsome, executive director of the Northern Virginia Conservation Trust, said turning the property into a park is still a better fit for the environment and the community. His organization is eager to broker a deal to that end, he said, but it would likely rely on the land being donated and finding remediation partners.

Pete Sitnik and his two siblings inherited the property on Richmond Highway a decade ago and have been looking for buyers who can make something more out of it ever since. A developer's offer to turn the lot into 43 townhomes now faces opposition. (Whitney Pipkin)

"Not only is this an important site ecologically, but it's a bellwether site for many others like it," Rowsome said. "It's also about the future of other parcels where landowners and developers are looking eagerly to see whether this is going to be an opportunity."

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a labor of love.

Fifty-six acres to be planted along tributaries of the West Branch and central Susquehanna River will mostly be in or near wilderness and span four northcentral counties.

A Lancaster County project will supplement a 17-acre restored floodplain with a buffer-to-table project: Officials from Warwick Township are talking with two local restaurants about using what the buffer produces in their dishes.

David Wise, restoration manager at the Stroud Center, has been promoting buffers to farmers for about 20 years and has been on the creative end of several successful strategies. He prefers what he calls the "tried and true" method: simply offering farmers a payment for taking streamside cropland out of production through federal programs, sweetened with additional funds and perks from nonprofit organizations like Stroud and the Chesapeake Bay Foundation.

"We would love to see this succeed," he said of the DCNR program. "We're just not as optimistic as we'd like to be."

The concept isn't going to appeal to every farmer, said Eric Burkhart, an ethnobotanist who teaches at PennState University and studies nontimber forest products.

"Not every landowner who has streamfront property that we want to vegetate is going to say, 'sure I can make money on this,' " he said. "Landowners who this appeals to tend to be driven more by philosophy and passion than your average growers."

Pollinators like this swallowtail butterfly have plenty to choose from in this Pennsylvania streamside buffer designed to feed wildlife and humans as well as protect water quality. The 5-year-old buffer on Happy Hollow Farm is often toured by agricultural groups and conservationists interested in taking on similar project. (Dave Harp)

Burkhart doesn't think that marketing the products is an issue. Sellers who specialize in medicinal crops, herbs, berries, ginseng, mushrooms and leeks can't keep up with the demand. It's a growing market, he said.

On the other hand, planting and harvesting woodland food is very labor intensive compared to crops like corn and soybeans, which can be harvested mechanically, and therefore is expensive.

"We don't have anyone who is successfully modeling this," Burkhart said. "We need more of the DCNR-type program to get things on the landscape for proof of concept."

To the south, at Virginia Polytechnic Institute, researchers surveyed landowners in three watersheds to see if there were any trends in the types of people interested in growing food in streamside buffers. The findings agreed with Burkhart's statement: Small farm owners who are philosophically oriented showed the greatest interest.

There is no reason that researchers, funders and proponents of agroforestry should discount these landowners, said John Munsell, a Virginia Tech professor of agroforestry. In some areas, those landowners make up a significant portion of a watershed.

Small farm and nonfarm landowners often have goals for their land that fit well with multifunctional buffers. Don and Ann English exemplify that point.

The couple designed and planted their buffer on weekends. Their weekdays are spent at jobs in the environmental field.

"Our goal was not production," Ann said. "It is a long-term commitment, and we're doing it for the experience. Don grew up with that piece of land. It was his family farm, and I've known it for a long time. It is important to us."

New study: Bay's reduced oyster numbers not due to overfishing

≈ Scientists claim that warmer temperatures drove coastwide declines in shellfish; others disagree.

BY TIMOTHY B. WHEELER

The skipjack Rebecca T. Ruark, with Capt. Emerson Todd at the helm, heads home to Cambridge, MD, with a boatload of oysters in 1976. The Baywide oyster harvest has been declining since the 1880s, with some estimates putting the current Chesapeake oyster population at 1 percent or less of its historic abundance. (Dave Harp)

Warmer winters, rather than overharvesting, caused the steep decline of oysters and other commercially valuable shellfish in the Chesapeake Bay and elsewhere along the Atlantic coast, according to a controversial new study that's getting pushback from some scientists.

The study, which appeared in *Marine Fisheries Review*, a quarterly journal of the National Oceanic and Atmospheric Administration, says that multi-year stretches of mild temperatures in normally cold weather months altered the food web in coastal waters. That impaired the growth and reproduction of oysters, quahogs, soft-shell clams and scallops, scientists said. It also led to increased predation on shellfish larvae and outbreaks of diseases.

"The temperatures got warm and that changed the whole environment, so [the oyster diseases] MSX and Dermo could flourish," said Clyde MacKenzie, Jr., the study's lead author and a longtime researcher at NOAA's Northeast Fisheries Science Center at Sandy Hook, NJ. Mitchell Tarnowski, who runs the annual fall oyster survey for Maryland's Department of Natural Resources, is the co-author.

The paper's conclusions, especially its dismissal of overfishing as a factor in the decline of the Chesapeake oyster, came under fire from scientists with the University of Maryland Center for Environmental Science and Chesapeake Bay Foundation. Its publication comes as the DNR prepares to release a first-ever stock assessment of the oyster population in the Upper Chesapeake, including an evaluation of whether current harvest levels are sustainable.

The scientific consensus has long been that overharvesting, disease and habitat loss over the decades devastated the Bay's oyster population, with some estimates putting it in recent years at 1 percent or less of historic levels of abundance. From an annual commercial harvest of nearly 17 million bushels in 1880, landings have trended downward, hitting historic lows in 2003-04 of just 50,000 bushels. The harvest has rebounded some since then, though much of the gain has come via private oyster farming, especially in Virginia.

MacKenzie and Tarnowski said they found that factors other than fishing pressure were responsible for the decline.

"In sum, the steep fall in oyster landings after 1900 was not simply a consequence of fishermen overharvesting oysters on the beds, as many scientists, including we authors, have routinely stated," they wrote.

The overriding influence behind a coastwide decline of shellfish, the paper's authors said, was a shift in environmental conditions brought about by a weather phenomenon called the North Atlantic Oscillation. It is an irregular fluctuation of atmospheric pressure over the North Atlantic that has a strong, wide-ranging impact on winter weather on both sides of the ocean.

When the oscillation is in its "positive" mode, with strong high– and low-pressure systems abutting each other, warmer, wetter conditions prevail over Northern Europe and northeastern North America. When the pressure differences are weaker, coastal areas experience colder, dryer weather.

Though those conditions can vary, or oscillate, from year to year, the study says that a review of weather data since the 1860s found two periods when they remained in the warmer, wetter mode for decades at a time. Coastwide, commercial oyster, clam and scallop landings fell during those periods.

The authors said that warmer waters in winter and early spring stress adult oysters and other mollusks, causing them to lose weight and produce fewer eggs. Those conditions also allow tiny crustaceans, especially hordes of speck-size copepods, to remain active, consuming the microscopic algae that oysters and other filter-feeding bivalves depend on for food, the study says. With less food available, the recruitment of new young shellfish suffered. Warmer waters may also have boosted the population of shrimp that prey on bivalve larvae, the scientists suggested.

The last such warming spell lasted from 1979 to 2002, the paper notes, and partially overlaps with outbreaks of the parasitic diseases MSX and Dermo in the Chesapeake and the spread of MSX to Long Island Sound off Connecticut. Harvests crashed in both places during that period.

The biologists did say factors besides the oscillation have hurt the wild harvest of oysters, including the loss of reef habitat. The Bay lost the vast majority of its historic oyster reefs to siltation, according to one 2009 report, as well as natural predators and harvest degradation.

The researchers acknowledge that watermen, in dredging oysters from the bottom, have worn down the reefs needed for new generations of oysters. As newly hatched larvae, oysters drift in the water for a week or two before settling to the bottom. They need to attach themselves to a hard surface, such as another oyster shell, if they are to survive and grow.

But the authors said that because harvesters were required by fishing regulations to return small oysters to the water, there were still enough to maintain and even rebuild the population — had other conditions been favorable.

"The general idea was it wasn't overfishing that caused the decline," MacKenzie said. The fisheries were essentially self-regulating, he said. As catches declined, so did the number of harvesters.

The DNR's Tarnowski is currently on the Bay full-time conducting the state's annual oyster reef survey and emailed that he did not have time to discuss the paper. The survey involves collecting samples from hundreds of reefs and usually lasts from mid-October through November or later.

The paper drew skeptical responses from some scientists who have been deeply involved in research on the Bay's oyster losses and on the long-running effort to restore the population.

"There is something to these climatic cycles and the productivity of living resources," said Donald Boesch, a professor of marine science and former UMCES president who served on Maryland's oyster advisory commission for years. Other studies have shown how finfish migrate northward when the waters are warmer, he noted.

But Boesch said that he thought the paper lacked sufficient data for the case it tried to make. For instance, he said, he was unaware of any detailed studies that would corroborate the paper's conclusions about the impacts of warmer water on oyster reproduction and the survival of their young.

"I think they really overextended the evidence to draw such dramatic conclusions," he said.

Michael Wilberg, another UMCES professor who specializes in analyzing fish populations and fisheries management, disputed MacKenzie's assertion that the Bay's oysters hadn't been overfished. "It's not to say that the environment doesn't affect shellfish population dynamics," he said, "but overfishing is definitely possible."

In fact, Wilberg and colleagues concluded in papers published in 2011 and 2013 that the Bay's oysters were overfished, with harvest rates exceeding the ability of a disease-diminished population to replace oysters and reefs lost from both natural and human-caused impacts. The earlier paper estimated that the bivalve population in Maryland's portion of the Chesapeake had fallen to much less than 1 percent of historic levels. They recommended imposing a moratorium on commercial harvests until reefs and a self-sustaining population could be restored.

At the time, the state's fisheries managers under then-Gov. Martin O'Malley rejected that recommendation. They did embark on an ambitious restoration effort, paired with a sweeping overhaul of the state's oyster management. As part of that, the state vastly expanded the areas in the Bay set aside as sanctuaries closed to commercial harvest.

Under Gov. Larry Hogan, the DNR last year proposed opening some of those sanctuaries for watermen, as Maryland's wild harvest, after a promising rebound several years ago, has been falling again. But the General Assembly blocked the DNR's move, ordering the agency to conduct a stock assessment before making any changes in sanctuaries. That report is due by the end of this year.

Wilberg has been working with DNR

REPORT CONTINUES ON PAGE 19

'Just short of a crisis': Tensions flare as VA halts oyster seed harvest in James

≈ VMRC also blocks out-of-state seed transfer permits in move to protect resource, state watermen's interests.

By Jeremy Cox

Virginia fishery managers are taking the rare step of halting oyster seed harvests in the lower James River as they seek to protect the baby bivalves from overfishing.

Oyster seeds are wild-grown juvenile oysters, or "spat." Many oyster farmers working in the Chesapeake Bay and its tributaries depend on regular shipments of fresh seed to replenish their lease areas.

The Virginia Marine Resources Commission expects to temporarily stop the catch before the season's scheduled closure at the end of the year. Without the action, watermen almost certainly would surpass the fall quota of 40,000 oyster seed bushels taken from the river, officials said.

The commission also agreed to block out-of-state seed transfer permits, effective Oct. 31. Between half and two-thirds of the seeds collected from the James are typically sold to Maryland buyers, according to the commission, which will decide whether purchases can resume in the spring based on fall surveys of the river bottom.

The moves come after the commission cut off last year's spring harvest — when as many as 80,000 bushels were up for grabs — with about a month left to go. That marked the first time since the cap was enacted in 2011 that the commission called on watermen to hang up their hand tongs.

"Basically, the quota did what it was supposed to do," said Andrew Button, head of the commission's oyster conservation and replenishment department. "It's not really to limit anybody but a way to protect the resource."

The James, the Piankatank and Great Wicomico are the only rivers where seed harvesting is permitted in Virginia, but the James is the most plentiful by far.

The James' public oyster seed area consists of a patchwork of reefs west of Deep Creek. To minimize disturbance, watermen are barred from dredging for seeds. They can only use hand tongs, which resemble large chopsticks with rakes attached at the end.

Maryland has no natural seed areas, so hatcheries, such as the University of Maryland Center for Environmental Science's Horn Point facility near Cambridge, help to fill the void. But many oyster farmers prefer the natural seeds because they tend to survive better and mature to market size sooner.

"The thing with the natural seed, you might have a set that's 1-year-old, [but] you might have some 2-year old oysters into it," said Robert T. Brown, Sr., president of the Maryland Watermen's Association. "The hatchery seed, it's all the same year-class."

Each of the small brown ovals is a juvenile oyster, or spat, that has set on the interior of an old oyster shell. (Creative Commons Image courtesy of Mike Congrove / Virginia Institute of Marine Science)

With natural seeds like those from the James, "the majority of it is small stuff, but you've got some like this into it," Brown said, holding his finger and thumb an inch or so apart.

The Bay's aquaculture industry has boomed in recent years, overtaking the Virginia public fishery's production value. Experts believe that will happen in Maryland as well by some time next spring.

Demand is soaring for the James River's oyster seeds. So, too, are tensions between Virginia and Maryland watermen over the resource.

"The way it's being bought out of state by tractor trailer, it's impossible for an individual waterman to compete with that," said Tommy Kellum, president of W. E. Kellum Seafood in Weems, VA. "We've got to get serious about this. It's just short of a crisis."

Virginia watermen get hit twice when the seeds are sold out of state, he added. They not only lose the seeds that could be relocated to their own lease areas, but they also must compete against those seeds once they're grown into full-size oysters and ready for market.

Kellum told the state's Shellfish Management Advisory Committee last summer that the surge in Maryland demand began in 2011. That's when Maryland began giving out $3 million in low-interest loans aimed at encouraging oyster aquaculture.

The Virginia Marine Resources Commission reacted quickly, creating the fall and spring quotas. For the first few years, the James River seed harvest topped out at about 80,000 bushels of young oysters — well below the 120,000 annual limit, Button said. But the last two years may have pushed the fishery to its limit and possibly beyond.

To keep tabs on the quota, the commission requires watermen to call in their catch numbers at the end of each day's harvest. Those numbers show they scooped up 36,000 bushels in the fall of 2017. Follow-up reporting put that figure above 47,000 – which is 7,000 more than the fall season's cap.

The heavy harvest appears to be taking a toll on specific areas, Button said. At a reef known as Point of Shoals, a recent survey showed that the density of cultch, the shells that oyster larvae latch onto, was the lowest recorded since modern surveying began in 2002.

The Chesapeake Bay Foundation, a regional environmental organization, applauds the commission's actions in the James.

"Obviously, the VMRC is trying to make sure that, no matter where the seed goes, that the seed areas don't get depleted," said Chris Moore, a senior scientist with the foundation's Virginia office.

Donald Webster, a University of Maryland aquaculture specialist, said that he hopes Virginia officials don't clamp down further on out-of-state oyster seed buyers.

But "I understand where Virginia is coming from," he said. "My interest is I would like to see us get back to producing 10 million bushels of oysters between our two states and build the biggest industry we can."

Tim Wheeler contributed to this report.

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biologists on their stock assessment. He was to outline its findings at a meeting Nov. 19 in Annapolis of the state's Oyster Advisory Commission.

Allison Colden, fisheries scientist with the Annapolis-based Bay Foundation, said she believes the paper made overly broad generalizations about the causes of oysters' declines in the Chesapeake. And she questioned the distinction the authors made between overharvesting and loss of habitat.

"You can't say overharvesting is not an issue, but degradation due to harvesting is," Colden said. "If the harvesting weren't there, then you wouldn't have further degradation of the habitat going on."

She also questioned the paper's focus on trends in commercial shellfish landings data, saying that's not a reliable way to gauge the abundance of fish. The catch can be affected by a variety of factors, including bad weather keeping harvesters on shore, declining markets or changes in fishing regulations.

Even if the North Atlantic Oscillation does influence oyster reproduction and survival, Colden said, fisheries managers need to work on what they can do to maintain and rebuild the population.

"You can't control how much it rains," she said. "But you can control the water quality to a certain extent, and you can control the harvest or fishing levels in the Bay."

Lower Shore farmer Virgil Shockley said he lost money raising corn this year on a pair of fields that the state phosphorus regulation barred him from fertilizing with his poultry manure. (Dave Harp)

PHOSPHORUS FROM PAGE 1

But if farmers have to limit use of free– or low-cost manure on their fields, they would need to buy more expensive chemical fertilizers to apply adequate levels of other nutrients, such as nitrogen, that are needed to grow their crops — something that impacts their bottom line.

Virgil Shockley, who raises chickens, corn and soybeans near Snow Hill in Worcester County, called it "a potential disaster in the making." The restrictions couldn't come at a worse time, he said. Growers are struggling financially with the poorest harvest they've had in a long time because of unrelenting rains, and crop prices are the lowest they've been in years, in part because of the U.S. trade dispute with China.

So far, only about 100 farms at the highest risk for generating phosphorus pollution have been affected by the rule, according to the Maryland Department of Agriculture — fewer than 10 percent of the number of farms that could ultimately be impacted.

Starting next year, the rule will apply to at least 250 more operations that have fields with somewhat less elevated phosphorus levels, state figures show. And in two years, the coverage will expand again, with the rule eventually expected to apply to approximately 228,000 acres on at least 1,661 farms.

While that's just about a fifth of the 1.1 million acres of cropland in Maryland, the impact will be felt unevenly. More than three quarters of the acreage with elevated phosphorus levels is on the Eastern Shore, and 56 percent is in just three counties that make up the Lower Shore.

In Maryland, the Shore's poultry industry, which generates phosphorus-rich chicken manure, is the reason for the rule's disproportionate impact there. The poultry litter — chicken waste mixed with wood shavings — that has been repeatedly applied as fertilizer typically contains more phosphorus than the crops can use, so it has built up in the soil. On the Lower Shore, soil tests reported to the state indicate that two-thirds of the cropland has elevated levels of phosphorus.

Reg could be costly for farms

Shockley's is one of the farms already affected by the rule. He said he spent $4,000 to $5,000 this year to buy commercial fertilizer for a pair of cornfields where the regulation prohibited him from using the chicken litter produced on his farm. Between the added fertilizer cost, low yields and poor markets, he figures he lost $10,000 on those fields.

Shockley fears the impact of the regulation as it spreads to more fields and other farms. "You're going to have some people go down," he warned.

Environmentalists say they're worried as well. They want to see more evidence that the MDA is tracking compliance with the rule. They're also questioning whether the state is doing enough to help farmers deal with the regulation, mindful that a lack of preparation could delay or derail its steady rollout.

"I have a great deal of concern,'' said Sen. Paul Pinsky, a Prince George's County Democrat and environmental advocate in the Maryland General Assembly. "I would like to be confident that the fields are not being overfertilized and running into the Bay."

He acknowledged, though, that the state's farmers have thin profit margins and can't afford to shoulder much higher costs.

"I don't want them to have to pay out of pocket," said Pinsky. "But we have to figure out a way to move the chicken litter to a place it's not going to do harm to the Bay and the tributaries."

Under the regulation, a farmer must use the management tool to assess the risk that phosphorus could leach or run off a field. Developed by University of Maryland researchers, the tool is a set of calculations for quantifying that risk, which factors in the phosphorus level, soil type, slope of the field and its proximity to surface water. Some phosphorus-rich fields may pose little risk, while some with relatively lower levels of the nutrient could still be prone to pollute.

Farmers fought restrictions on phosphorus for years, and Gov. Larry Hogan campaigned in 2014 on a pledge to block the regulation put forward by his predecessor, Martin O'Malley. Hogan promptly withdrew it once he took office, but about a month later reinstated it. He extended the phase-in — seven years instead of six — and pledged to pull it back again if it looked like farmers would face serious financial losses. Farmers finally accepted it, saying they trusted Hogan to take care of them.

Too early to gauge impact

With relatively few farms affected to date, the regulation's reach is not widely felt. Lindsay Thompson, executive director of the Maryland Grain Producers Association, recently canvassed her board of directors, who told her, "they don't really feel like they're far enough along in the process to really say how it is going to impact them."

But some farmers, fearing the changes ahead, are reviving questions about the justification for the rule.

"I've still got heartburn having to agree to what I agreed to," said Charles Wright, president of the Wicomico County Farm Bureau. Though the rule

PHOSPHORUS CONTINUES ON PAGE 21

The phosphorus management tool, or PMT, was designed to reduce the amount of the phosphorus that could run off some farm fields into local waterways. (Dave Harp)

Phosphorus from page 20

is the product of more than a decade's worth of research, Wright said he believes it's "more political science than actual science."

Wright said none of the 800 acres that his family farms has particularly high levels of phosphorus, but he knows a few other farms that have been affected.

"It's going to be a huge financial burden," he predicted, especially if the price farmers can get for corn remains so depressed.

Two years ago, state officials looked at eight farms to see how the phosphorus rule might affect them. On one poultry farm, they found that the cost of raising corn went up by nearly a third, from $91 per acre to $123.

Hans Schmidt, assistant secretary of the Maryland Department of Agriculture, said state officials are monitoring the phase-in of the rule and so far have seen nothing alarming.

"We feel pretty good where we're at," said Schmidt, who is himself a farmer in Queen Anne's County. "We've got a good handle on where high-phosphorus soils are in the state [and] on how farmers are handling it."

Statewide in 2017, Maryland poultry growers produced 307 million birds, which in turn generated about 400,000 tons of manure. Because some farmers will be using less poultry manure for fertilizer, growers will likely need to find other places — and other ways — to use it. Some recent changes in industry practices may be easing the challenge, Schmidt said.

Perdue Farms, for instance, has shifted from having its growers clean manure out of poultry houses annually to doing it every three years, according to a company spokesman. Some growers are doing a "crust-out" between flocks, removing the top layer of litter and putting fresh wood shavings on top of the remainder. But based on 2017 data from the MDA, those changes have not reduced the overall amount of poultry manure being produced.

For growers who can no longer spread chicken litter on their own fields — or, in the case of many newer growing operations, have no crop fields at all — Schmidt said it appears they're still able to find someone to take it off their hands. Based on soil sample data collected by the state, there are more than enough acres, particularly on the Upper Shore, where phosphorus levels are low enough to safely use the manure.

For several years now, Maryland has had a manure transport program through which all types of animal waste can be hauled from the farms that generate it to farms that can use it for fertilizer. The poultry industry kicked in about a fourth of the $1.6 million spent by the state trucking animal waste in fiscal 2017, according to the MDA.

In all, 249,000 tons of manure got moved in fiscal year 2018, but three-fourths of that came from cows and other livestock, not from poultry houses. Of the 400,000 tons of poultry litter generated that year, less than 20 percent got moved by the state program. Private haulers are handling the transport of most of the poultry manure, Schmidt said.

Where is all the litter going?

Environmentalists say they'd like to know where all of the litter is going and be shown that it's being safely used elsewhere.

"The lack of transparency and accountability on these [phosphorus] regulations has been frustrating," said Kathy Phillips, executive director of the Assateague Coastal Trust, which monitors water quality issues on the Lower Shore.

Some worry that trucking the manure to other fields is setting them up to become sources of phosphorus pollution in the future.

"We really want to get a grip on these private haulers, what they're moving how much they're moving and where they're moving it, to make sure it's being safely applied, said Matt Pluta, the Choptank Riverkeeper, part of the ShoreRivers watershed group.

State officials say poultry growers must report how much manure they're shipping off-site, and farmers who take it must report that, too.

But Schmidt said the state so far has not compiled data on those privately arranged movements. He noted that state rules bar its use on any field unless the phosphorus level is well below what's considered elevated.

From the fall of 2017 into early 2018, state inspectors checked 26 farms that had been immediately banned from putting any more on phosphorus-saturated fields. Two were cited for overapplication and other issues, but the rest had records indicating they had complied.

Though private haulers and the state seem able to handle the current volume of manure being shipped off farms, some are concerned that they won't have the capacity to deal with a sudden increase in demand for transportation.

In response to queries from Pinsky, MDA Secretary Joseph Bartenfelder wrote that the Hogan administration believes it has enough funds budgeted to handle manure transport through June 2020. That may change afterward, Bartenfelder said, when another 122,000 acres of farm fields come under the regulation.

Should transportation not prove a viable option for all of the manure that can no longer be used, the state has been encouraging alternative technologies. The MDA has invested $5.8 million in pilot projects evaluating the feasibility of composting manure, processing it to generate heat or electricity and separating the phosphorus from the other nutrients. The largest proposal to date would still only handle a fraction of the Shore's poultry litter.

It's not clear how sustainable large-scale alternatives can be, either. For more than a decade, Perdue AgriRecycle, a subsidiary of the Salisbury-based poultry company, offered to clean out chicken houses for free and process the litter into dry pellets for use by farmers, gardeners and turf managers. But the company wound up having to buy litter and never made a profit, spokesman Joe Forsthoffer said. The pelletizing plant has been mothballed, and the

Farmer Virgil Shockley examines the soggy roots of one of his soybean plants. Farmers struggled this year with low crop yields because of unfavorable weather and poor markets, aggravated by the U.S. trade war with China. (Dave Harp)

Farmer Virgil Shockley checks soybeans in a field that may be too wet to harvest this year, especially if mildew sets in before the ground dries enough for a combine to work. (Dave Harp)

Phosphorus continues on page 22

PHOSPHORUS FROM PAGE 21

company has replaced it with a smaller composting operation, which takes other wastes as well.

Some growers say they fear the businesses selling commercial fertilizer won't be able to satisfy a big jump in demand as more farms cut back on use of manure. And others, including environmentalists, worry that the state has not anticipated all the issues associated with implementing the rule.

"I would like to see a fuller discussion of the resources needed to implement this [rule]," said Alison Prost, Maryland director of the Chesapeake Bay Foundation. "I worry that we're not anticipating the problems or digging in and projecting the quantities," she said

The regulations allow the MDA to delay their effectiveness for a year should problems arise. On Nov. 20, after hearing concerns from Shockley and other farmers, an MDA advisory committee voted unanimously to seek an evaluation of whether a delay is warranted. Environmentalists on the panel supported the move, though Prost cautioned that the review "has to be scientific and objective" for her to go along with a delay. Deputy MDA Secretary Julianne Oberg said the evaluation could take several months.

"We can probably get by next year," Shockley said. It's the year after, when the acreage jumps again, that worries him.

In the meantime, Shockley said he was hoping the weather would clear up enough before December so his soybeans could dry out enough to get a decent price once harvested. In mid-November, with rain falling every few days, he didn't sound optimistic.

"It's been a perfect circle this year," he said, ''as far as what could go wrong has gone wrong."

As he spoke, he opened an envelope he'd just received in the mail and discovered he didn't get the already depressed price for a truckload of soybeans he'd recently harvested. Because of the dampness, they weren't dry enough to be top quality. He figured he'd lost $300 on that load.

"The question becomes: Do you really want to put farmers out of business?" he asked "The other question is: Do you want to eat tomorrow?"

Pinsky, the environmental lawmaker, said he's still searching for a "win-win situation." But he's against taking a timeout on the phosphorus regulation to find it.

"If we delay it, and we save the farms and kill the Bay, then the watermen are not going to have jobs," he said. "People are not going to boat on the Bay. It's one sector of the economy versus another. …It's a devil's choice, and I think it's wrong."

DIVERSITY FROM PAGE 1

of people in the preservation of the outdoors begins, in many ways, with inviting more people to enjoy them.

A growing number of organizations have begun to tackle that challenge. Efforts are under way at the local, state and national levels to make land– and water-based recreation more welcoming and accessible to a broader range of people. At the same time, outdoor enthusiasts who feel excluded by images and narratives that mostly depict white people enjoying activities like hiking, camping and boating are connecting with one another and speaking up.

At the national level, a 2009 survey by the National Park Service drew attention to the imbalance of ethnic groups among its visitors. The survey found that 9 percent of national park visitors were Hispanic, 7 percent were African American, 3 percent were Asian and 1 percent were American Indian or Alaska Native, while 78 percent were white. Visitation among minority groups remains well below the percentages of those groups within the U.S. population. Despite recent outreach efforts, a majority of visitors to national parks still "look like me: older and whiter," then-U.S. Department of the Interior Secretary Sally Jewell said during a centennial speech in 2016.

Barriers that tend to perpetuate these disparities include a lack of diversity among park service staff — nearly 80 percent are white — and either a perception that the stories told at these sites are not relevant to ethnic minorities or fail to ensure that narratives connecting their heritage to a particular site are well-represented. Visitation is also hampered by a lack of reliable transportation to public lands that are far from residential areas.

But that doesn't mean that underrepresented people have little interest in the outdoors or enjoying public lands. Surveys in 2016 found that 70 percent of voters of color participate in the types of activities commonly offered on national lands, and 57 percent of voters of color had visited public lands in the last three years.

Bryan said that improving access to these sites could also benefit communities disproportionately affected by chronic health problems. Some illnesses can be at least partially alleviated by spending time outdoors for recreation and exercise.

"We think these lands provide a real opportunity to address multiple issues impacting the lives of way too many Americans," Bryan said.

The Next 100 Coalition was formed during the park service's 100th anniversary in 2016, when about 45 organizations agreed to work together to improve diversity and inclusion on public lands. The coalition helped to push for a federal directive to promote this goal on federal lands, and President Obama granted the request with a presidential memo issued in early 2017.

The U.S. Forest Service was among the agencies urged to expand their interpretation of public sites to include a diversity of cultural narratives.

Kimberly Winter, who manages the NatureWatch program for the agency, said she has already seen a "continuous push" for more diversity within its programming. But she said new leadership has helped to accelerate those efforts. (The Forest Service's previous chief stepped down earlier this year amid sexual harassment claims).

Winter said the service's new chief, Vicki Christiansen, "gets it" and has been working on these issues throughout her career. Five years ago, the agency also hired a diversity and inclusion specialist to help make public spaces more inviting to a wider range of people.

Children participate in a water activity at a RioPalooza event in July along the South Fork of the Shenandoah River that offered outdoor activities to Spanish speakers. The event gave participants the opportunity to paddle down or snorkel in the river, with educational activities and picnics on land. (Alan Lehman / Potomac Riverkeeper Network)

"The intent is, where we have a diverse demographic like here in the [Chesapeake] area, that we intentionally provide direction to our staff and teams that this has to happen," Winter said, "that it's not passive."

Winter said that making these efforts means moving beyond "the traditional sort of 'solitude' image that mainstream America has of national parks and public lands."

She said research indicates that most advertisements intended to get Americans outdoors — the ones that feature quiet mountaintop experiences or hikes focused on solitude — don't appeal as much to Spanish speakers.

"People tend to focus on being out in the big outdoors as being away from people," said Winter, who met her Bolivian spouse while serving in the Peace Corps. "But we find the opposite desire among Latin Americans. They might want to have their picnic tables all together and get out there to enjoy the outdoors with family and friends — together."

This summer, the Potomac Riverkeeper Network worked with partners on a summer-long event series celebrating the Potomac River and made a special effort to welcome the His-

DIVERSITY CONTINUES ON PAGE 23

A Box of Rain camper leaps off the dock at Truxtun Park in Annapolis in July. Box of Rain, a nonprofit organization designed to inspire and encourage Annapolis area youth from disadvantaged circumstances, helps children develop life skills and build self-esteem while participating in maritime activities, including swimming and kayaking.(© Sarah Jane Holden 2018)

Diversity from page 22

panic community. Rather than simply circulating information about some of RiverPalooza's events on Spanish radio stations or websites, they designed an event specifically for Spanish speakers.

"Latinos in the greater DC area really enjoy the environment, and we think they are underserved in most events like these," said Shenandoah Riverkeeper Mark Frondorf. "We wanted to make it more accessible."

Using the Spanish word for water in its name, "RioPalooza" provided many of the same resources as the rest of the river festival — but all in one day and in both English and Spanish — drawing 95 people to the Low-Water Bridge Campground in Bentonville, VA. The event served as an introduction to the region's many outdoors and water-oriented resources with opportunities to fish, raft and snorkel in the slow S-curves of the Shenandoah River's South Fork.

RioPalooza also was sponsored by Corazón Latino, a DC-based nonprofit that runs the Forest Service's Descubre el Bosque (discover the outdoors) program and website to help Latinos connect with nature and access public lands.

In Annapolis, a program called Box of Rain is hoping to encourage a lifelong interest in the outdoors by working with youth. It started as a small summer camp in a neighborhood where access to outdoor recreation is limited — including participation in the many maritime activities central to the waterfront culture of Annapolis. The program works with schools to introduce students to sailing, kayaking, swimming and fishing, and has grown to serve about 100 young people each year.

After being acquired by the Annapolis Maritime Museum & Park earlier this year, Box of Rain and its students will have access to even more educational resources during the 2019 summer program.

"The Chesapeake Bay is, oftentimes, a stone's throw from where they live, but, before this program, they were not interacting with it," said Alice Estrada, executive director of the museum and its recently acquired 12-acre nature park.

Box of Rain started in the wake of a local tragedy after a man named Lee Griffin was murdered during a carjacking in 2002. The young men involved in the murder were from one of the areas Box of Rain — which takes its name from a Grateful Dead song — now serves.

"There are obviously other programs that attempt to connect kids with nature. But this one is really trying to connect these children not only with the Chesapeake Bay but [also] with the maritime culture that is unique to Annapolis," Estrada said.

Kevin Bryan visits Peirce Mill in Washington DC's Rock Creek Park. As lead coordinator for the Next 100 Coalition, Bryan is focused on ensuring that national park lands remain relevant for at least another century by appealing more equally to all Americans, especially those who are underrepresented in some public spaces. (Dave Harp)

As organizations large and small work to address disparities in outdoor recreation, others say it is equally important to correct the impression that people of color aren't already outside and loving it. Some of these outdoor enthusiasts say that their presence goes largely unnoticed and their stories aren't being told. Danielle Williams, an African American disabled skydiver based in Bethesda, MD, decided to do something about it.

"We didn't feel like we were being included in advertising or traditional narratives about the outdoors," Williams said.

As a result, Williams started DiversifyOutdoors.com, a clearinghouse for nearly 30 organizations, nonprofits and outdoor influencers from diverse backgrounds, early this year. She also runs Melanin Base Camp, a blog focused on the experiences of underrepresented groups in the outdoors.

"Instead of waiting for a brand to deem your story worthy of amplifying, you see a lot of people starting to tell their own stories," Williams said.

Williams said social media has helped her to connect with other people of color who skydive and people with disabilities who enjoy camping. The hashtag popular among these groups, #diversifyoutdoors, has been used more than 25,000 times on Instagram. Social media accounts and websites such as Natives Outdoors, Brown Girls Climb or Fat Girls Hiking provide a sense of community to people who might otherwise feel alone in certain spaces.

Taken together, their endeavors are emboldening — and building — a future for the nation's outdoor spaces that could bring new meaning to the phrase "biodiversity."

Otsego Lake only a glimmer of great Susquehanna to come

This narrow band of water flowing from Otsego Lake in upstate New York is the beginning of the Susquehanna River, which travels more than 400 miles to empty into the Chesapeake Bay at Havre de Grace, MD.

The Susquehanna River starts its 444-mile journey as a lazy creek in Cooperstown, NY. It begins as an outflow from Otsego Lake, where its southern tip abuts the town.

Story & Photos by Donna Morelli

It then flows slowly under the Main Street Bridge before rounding a bend toward downstream destinations — farms, towns and cities in central New York and Pennsylvania — and ultimately reaching the Chesapeake Bay in Maryland.

Looking eastward from the bridge — minutes away from the world-famous National Baseball Hall of Fame — you can see the first few 100 feet of that narrow slip of water with the lake and distant mountains as backdrop. It's a lovely postcard scene. When I took in the view this fall, I found it hard to believe that this small, clear stream, reflecting the faded color of the trees back at me, becomes a mile-wide river by the time it reaches Harrisburg.

Late autumn is a quiet time in this part of New York — a few weeks of crisp days, bright blue skies and maybe a few snow flurries that don't stick — before the deep freeze of an upstate winter. In the small, quaint village of Cooperstown, the intense bustle of summer tourism is over and the last leaf peeper has gone home. Of course, the National Baseball Hall of Fame was still humming. About 300,000 visitors from around the world make it their destination each year. Neighborly greetings filled the air as the local population took back its town and enjoyed a meal or a beer. The restaurants and bars had their televisions tuned to the playoffs.

The hills and valleys that give rise to both the lake and the Susquehanna River are rich with forests, waterfalls and caverns and chock-full of history. They were home to Native Americans for thousands of years. Much later, they became part of the "Leatherstocking Region," named for a series of novels published in the 1800s called *The Leatherstocking Tales.*

Otsego Lake is massive: an elongated body of water, almost 8 miles long and covering 4,046 acres. Formed 10,000 years ago when the tongue of a continental glacier a mile thick — crossing at least a third of the continent — scoured out the Susquehanna Valley from exposed limestone that would become the lake floor. (That limestone still helps to protect water quality in the lake because it neutralizes acid rain.) As the glacier retreated, ice melt filled the depression, creating the lake, the Susquehanna River and many of its tributaries.

The wooded shores of Otsego Lake are still sparsely developed. Some large waterfront mansions there, with expansive lawns and formal gardens, speak to the wealth of local families, some of whom can trace their lineage back to the 1700s.

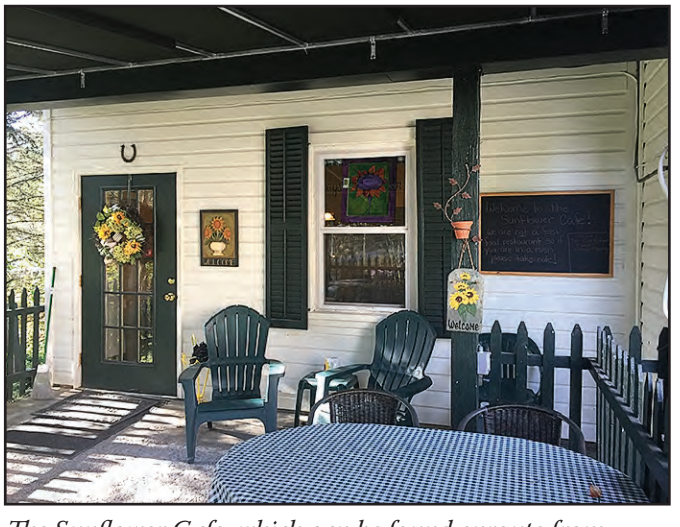
Several local businesses rent kayaks and canoes and even power boats. Don't be surprised if someone at a public launch site asks where the boat, whether rented or owned, has been last. It's part of an attempt to stop the spread — or introduction — of invasive species to the lake. Water stewards sometimes staff the launch areas to inspect your boat and provide a mobile boat-wash station to rinse it off if necessary.

Perhaps the best way to explore the landscape around Lake Otsego is to visit Glimmerglass State Park, located on the northern shore. You can camp there year-round. Or, you can also rent a cabin in nearby Betty and Wilber Davis State Park or a book a room at a bed and breakfast or a Cooperstown hotel. The park is only 8 miles from Cooperstown, so if you prefer your fire indoors while you relax on a cushy couch, options for comfort are many.

The park has well-marked trails and a good amount of lake access for swimming, boating and fishing. The views of the lake from picnic areas and the roadside are alone worth the trip; Glimmerglass has been called New York's most scenic state park by reviewers on various websites.

One of the most beautiful views of the lake is from the expansive front lawn of Hyde Hall, a 50-room mansion built in the 1800s. The entire 593-acre park was once part of the Hyde Hall estate, owned by Englishman George Clarke, who kept adding onto his country house for 17 years. The house and grounds are now a museum, and tours are offered from May 26 until Oct. 31.

On my way to Glimmerglass State Park, I found a stop



The Sunflower Cafe, which can be found enroute from Cooperstown, NY, to Glimmerglass State Park on Ostego Lake, is a quaint stop for locally sourced food.

Forested trails in Glimmerglass State Park (left) are a good way to explore the landscape around New York state's Otsego Lake, which is the source of the Susquehanna River. The lake and surrounding area are also known for inspiring some of the settings in The Leatherstocking Tales, a series of novels published in the 1800s that feature the fictional frontiersman Natty Bumppo. Much of the landscape along the lake's shoreline (above) remains undeveloped, due in part to the presence of the state park and a local conservation ethic, providing plenty of outdoor opportunities within short reach of Cooperstown.

at the Sunflower Café well worth my while. The restaurant is in a little house, painted with sunflowers outside and inside on tables, walls and in artwork on the walls. A blackboard outside proclaimed, "We're not a fast food restaurant. Good food takes time." Most of the food is super local, procured within a 15-mile radius of the restaurant.

The menu includes an elk burger, which had unfortunately sold out on the day I stopped by. But I enjoyed tomato soup and an extraordinary grilled cheese — made from myriad choices such as local cheddar, Gouda, fig jam, spinach, sun-dried tomatoes, and asparagus. The soup and my custom-made grilled cheese hit the spot, and I was ready for the trail.

Of the four short trails in the park, I chose the Sleeping Lion Trail. It was the only one with some elevation. The park brochure also said it was the best choice for seclusion, and I wanted to get into the woods that have remained the same since the Clarkes lived in Hyde Hall.

The loop trail climbs up and down the slope of Mount Wellington, which rises behind the mansion. The peak is on private land, so this trail only takes you half way. It's called the Sleeping Lion Trail because some say the mountain, when viewed from a distance, resembles a lion lying down.

The hike is about 2.4 miles through a hemlock forest and rated as a moderately strenuous, which I found fairly accurate. The first quarter mile of the hike included a series of short climbs. The canopy of hemlock and white pines is thick enough in areas to partially block daylight. There was no undergrowth beneath these giant trees, just straight trunks reaching for the sky. And it was quiet. So quiet that a tiny chipmunk scurrying about in the dry leaves on the forest floor made me jump. Even the birds made little noise in the heavy, mature forest. Two white-tailed bucks bounded away when I approached.

The forest had both the look and feel of Natty Bumppo country. Because that's what it is.

Natty (Nathaniel) Bumppo (portrayed by Daniel Day-Lewis in the 1992 movie, *The Last of the Mohicans*) is the fictional frontiersman in *The Leatherstocking Tales,* a woodsman and trapper raised by Indians, complete with leather stockings and fringed jacket. The author, James Fenimore Cooper, was the son of William Cooper, who owned the land where Cooperstown was founded in 1786. William was able to acquire great swathes of land around the lake and sell lakefront lots to farmers and aristocrats.

Many local spots are named after characters or events in his son's books, as well as the family name. In the novels, Cooper renames Otsego Lake "Glimmerglass" because of its smooth surface. The name was given to the state park as well as the local Glimmerglass Opera company. You can also hike to "Natty Bumppo's Cave" on the eastern shore of the lake, said to be one of Cooper's favorite childhood hangouts and the inspiration for a cave Natty uses in one of the novels. To find it, drive along Route 31 and look for a historical marker and a very small pull-off. The trail isn't long, but it is a rocky and challenging climb.

The Fenimore Art Museum is located on the former estate of one of Cooperstown's influential philanthropists, Stephen Carlton Clark. Clark was an avid art collector and in 1944 donated one of the family's lakeside homes and much of his art collection for the museum. The estate was called Fenimore House because the mansion was built on land where Cooper's farmhouse once stood. The museum houses several permanent collections of U.S. art, including American Indian art and several paintings depicting scenes in *The Leatherstocking Tales.*

It was Clark's grandfather, Edward, who established the family's conservation ethic that continues today. In 1870, Edward had the foresight to start buying land around Otsego Lake to protect it from development. Today, Jane Forbes Clark — Edward's great-great granddaughter — is president of the Clark Foundation, which supports the Otsego Land Trust, Otsego County Conservation Association and other organizations that preserve the landscape around the lake. The foundation, itself, owns approximately 3,000 acres of farmland, forests and lakeside property, which Jane Clark is committed to maintaining in its largely natural state.

The result, for the visitor, is an opportunity to explore a small, out-of-the-way town that offers a variety of attractions amid a landscape where you can marvel at the origins of a mighty river and imagine a glimpse of Natty Bumppo on its shores.

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Asters bloom along Maryland's Nassawango Creek in November, heralding fall's last hurrah. (Dave Harp)

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Berries from Euonymus americanus pop out of their pod along the banks of Nassawango Creek on the Delmarva Peninsula. Also know as American strawberry bush or, appropriately, Hearts-a-bustin, the solitary plant grows in shady areas. (Dave Harp)

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The fading green of spatterdock lilies dapple the reflection of autumn's vivid colors on Maryland's Nassawango Creek on the Delmarva Peninsula. (Dave Harp)

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Their seeds spread by the wind to benefit next year's monarch butterflies, these milkweed pods stand in contrast with the blue water of a farm pond. (Dave Harp)

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Forum

Commentary • Letters • Perspectives

This 'half measure' might be enough to save Bay for next generation

By Joel Dunn

"A man knows that the world is not given by his fathers, but borrowed from his children." Although the author of this quote is under debate, there is no debate over the truth it contains (Dave Harp).

Eighteen million people call the Bay watershed home. That means we have 18 million reasons to protect this landscape and, incidentally, we will have an additional 4 million reasons by 2050. If we don't increase our focus on protecting and restoring the Chesapeake, our children and grandchildren won't experience the same Bay that we do today — full of wildlife, history and wonder.

The World Wildlife Fund recently released a startling report that said, on average, we have seen a 60 percent decline in the world's mammal, bird, fish, reptile and amphibian populations since 1970. That means over the course of two generations, we have seen more than half the world's wildlife disappear.

If I am honest with myself, I am not surprised that the numbers are as high as they are. I have witnessed firsthand the impact that deforestation has in all of the various places I have lived throughout my 41 years — New England, the Pacific Northwest, Central and South America, and most recently, the Chesapeake. The WWF's findings simply add up all of the habitat loss and land use changes into one solid statistic.

Globally, it is clear that our natural assets can no longer be taken for granted. Closer to home, we must take action to make sure that the Chesapeake remains a thriving ecosystem for generations. We would want Rachel Carson to confirm to our grandchildren that spring is just as boisterous as we remember it being as children.

We would want Aldo Leopold to confirm that the "fierce green fire" has not died out. We would want Teddy Roosevelt to tell us that we have been fierce stewards of the most glorious heritage a people ever received.

We need to adopt the Native American philosophy of thinking seven generations into the future — and plan and act for them. In the face of global catastrophe, it's time to do things wildly differently and to think and plan at previously unimaginable spatial scales.

Noted conservationist E.O. Wilson, author of *Half-Earth*, proposes a bold plan to save our imperiled biosphere: Conserve half the surface of the Earth, both land and ocean, to maintain nature.

It's time to put serious consideration into setting a goal of maintaining half of the Chesapeake Bay watershed by conserving and restoring working lands and natural lands and the places that matter for the future of our region. Something like this can and should only be done with willing landowners and using precision conservation techniques, so that it is done at the direction of communities and in the right places on the landscape.

In November, the Wyss Foundation launched an unprecedented $1 billion campaign to help nations conserve 30 percent of the planet by the year 2030. "From the forests that supply our drinking water to the rugged backcountry that inspires the imagination of our children, everyone on Earth has a stake in conserving our planet's wild places before they are gone," said Hansjörg Wyss, the philanthropist who launched the Wyss Foundation. Both Wilson and Wyss are thinking big, and we need to take the same approach in the Chesapeake.

Currently, approximately 22 percent of the land area in the Chesapeake watershed is conserved. This includes important working lands, rich farmlands and productive forests, as well as our natural lands, including national and state parks and wildlife areas.

In comparison, approximately 11 percent of the watershed is developed.

A distant goal of protecting 50 percent of the watershed's working lands and natural lands would still leave around 39 percent available for future growth and development and other needs of society.

A distant goal of protecting 50 percent of the watershed's working lands and natural lands would still leave around 39 percent available for future growth and development and other needs of society.

The 2014 Chesapeake Bay Watershed Agreement committed to protecting 2 million acres of additional land by 2025, along with 300 new public access sites. It's now almost 2019, and we're halfway to both the 2-million-acre goal and the access goal, which is certainly something to celebrate.

But we need to begin to identify goals beyond 2025. We've gotten this far with an "all of the above" strategy, bringing together federal, state and local officials; private landowners; philanthropists; nonprofit advocates; ecosystem investors; Native American tribes; and many others to share knowledge, financial resources and innovative solutions. Importantly, we have also begun to move from viewing conservation as individual acts to conserving and connecting larger ecosystems.

We all want a vibrant economy, strong communities with places to work and live, working farms and forests, vital habitat for native wildlife and clean water. We also want to preserve our shared heritage, recreational opportunities and quality of life. And, we should consider all of the interests, needs and desires that come to bear on our beloved Chesapeake in forums where all may feel free to learn, be open and transparent, and listen to others.

Let's take Wilson's and Wyss' ideas to our own backyard and, with those insights as a beacon, seriously think through how these ideas apply to our Chesapeake Bay and watershed.

For us all, it is time to think big, because our Chesapeake is the biggest asset we all share, and with careful stewardship, we can pass on something we are proud of to our children and grandchildren. This is the goal of a lifetime.

Joel Dunn is president & CEO of the Chesapeake Conservancy.

Forum

Commentary • Letters • Perspectives

How can we understand a Chesapeake we've never seen?

"Why will you ask for other glories when you have soft crabs?"
—Oliver Wendell Holmes, chiding Baltimore in an 1860 essay

By Tom Horton

A vintage photo of the oyster fleet in the Chesapeake Bay, probably around the early 20th century.

Nowadays, around 350 million to 450 million blue crabs inhabit Chesapeake Bay, according to accurate surveys. That's not harvests, mind you, but all crabs — soft and hard, from thumbnail size up. It supports fishing that both watermen and chicken-neckers are fairly happy with.

But how happy should we be? Should we expect more in our quest to restore the estuary's health?

Consider: In 1883, W.K. Brooks, a Johns Hopkins scientist who studied the Chesapeake closely, found Virginia hard crabbers routinely making up to two dollars a day, selling their catch for a *penny* a dozen. That translates to around 20 bushels — and they were using sail power or rowing only, running trotlines, working only the Bay's shallow fringes, no more. Crab pots, which would have let them harvest deeper water, hadn't been invented.

And they were knocking off work by around 10 a.m. — noon at the latest.

Hard crabs, Brooks wrote, had so little value that fish netters shook them from their meshes, leaving thousands crushed and dying on the shorelines.

As for soft crabs, which had begun to fetch a decent price, the town of Crisfield in high harvest would ship 180,000 of them a day in 1909, with Deal Island adding another 50,000 a week. In 1916, as many as seven railroad cars of fresh softies rolled out of Crisfield some days.

These crab stories are told by retired University of Maryland scientist Victor S. Kennedy in his new book, *Shifting Baselines in the Chesapeake Bay: An Environmental History* (Johns Hopkins Press).

Kennedy has examined the Bay's past abundances of seafood, from terrapins and sturgeon to oysters and shad and waterfowl, sifting through anecdotal evidence and early surveys to arrive at a sense of just how full of life the Chesapeake was as Europeans began to settle it.

His book also pulls together an accounting of how thoroughly we squandered the "immense protein factory" praised by journalist H.L. Mencken.

Kennedy says "generational amnesia" relating to historical abundances risks setting the bar too low for restoration goals.

Chesapeake Born

Such forgetfulness can happen quickly. In the 1980s, the late Martin O'Berry — who for decades captained research vessels for the University of Maryland — had tears in his eyes when he told me how frustratingly impossible it was during fish surveys to make politicians, environmental managers and young scientists understand just how enormously abundant the Bay had once been.

They were thrilled with the marine life that came up in O'Berry's trawls. He'd explain how it paled in comparison to what similar trawls yielded just 25 or 30 years before — before the big declines in seagrasses and oxygen hit the Chesapeake. "But they just didn't get it," the old captain said. "You don't know what you never saw."

So Kennedy's fine and readable effort, released in late November, does a real service as modest upturns in Bay water quality have us daring to think about what a "saved" Chesapeake might look like. It's not just about quantity. The book describes oysters stretching almost continuously for 140 miles along the Eastern Shore from Kent Island to Cape Henry in 1869.

But that was grossly unlike the original state of oysters in the Chesapeake, Kennedy writes; rather it represented the efforts of 1,700 dredge boats and 3,000 tongers working at the time in Maryland alone — breaking apart the dense but widely separated reefs in which oysters naturally occurred — and scattering the mollusks far and wide.

For a time, this scattering must have seemed an improvement, as oysters, freed from their reefs, grew fuller and fatter and easier to harvest. Now we know it also made them more vulnerable to covering by sediment, and it destroyed the massive capacity of the reefs, themselves, to harbor myriad other Bay life.

Perhaps though, it explains the belief, deeply held to this day by oystermen, that "working" the bottom is vital to healthy oysters, even as science guides us toward establishing sanctuaries where reefs can once again form.

A provocative final chapter examines how the pre-European Chesapeake may have been different ecologically as a consequence of its bounty. Shoals of spawning fish, so vast they created waves coming upriver that were visible at a distance, were bringing into the estuary massive amounts of nutritional energy harvested from the oceans, in their flesh, feces, urine, mucus.

Likewise for the sky-darkening flights of waterfowl, whose nightly noise likely kept native humans awake, and whose taking flight could be heard miles away. From across the continent they brought in their bodies and their wastes, significant energies to fuel Bay food webs.

Perhaps a lot of the nitrogen that now fuels too much algae in the modern Bay was tied up then in the living tissues of all of those fish and birds.

"You cannot manage what you do not understand," the author says; and this book moves us toward understanding better the great gift that was Chesapeake Bay.

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

Forum

Commentary • Letters • Perspectives

CBF celebrates 40 years of immersing students in watershed experiences

By Tom Ackerman

Forty years ago, the Chesapeake Bay Foundation began environmental education programs on Smith Island and in Baltimore Harbor. To date, the organization has educated more than 93,000 students, teachers and principals at Smith Island alone. Pictured here in a photo from the 1980s are a mixture of CBF educators, island youths and participants. (Chesapeake Bay Foundation)

Forty years ago this fall, a group of school teachers arrived at the remote fishing village of Tylerton, MD, on Smith Island with their sleeping bags. Then, they put on old sneakers and walked into the nearby salt marshes.

Those teachers from Baltimore County were the first group to participate in the Chesapeake Bay Foundation's Smith Island education program, which was created in September 1978. Almost simultaneously, the CBF launched its Baltimore education program. Both programs are celebrating their 40th anniversaries.

The two initiatives were significant steps in a wider, national move toward experiential learning born in the 1970s. Students learn best through experience and by reflection on that experience. The idea is embedded in modern educational practice, but at the time, it was novel. The CBF played a major role in that experiment, and the Smith Island and Baltimore programs were its outdoor laboratories.

The Tylerton facility was born when the foundation bought a house from a retiring waterman and his wife. Bill Goldsborough, the first CBF manager of the program, hauled in government surplus bunk beds to accommodate 20 guests. Goldsborough and Don Baugh, another early CBF educator, also managed to add a second bathroom. The young men were desperately (and recklessly) using power tools to complete the plumbing while lying in standing water under the house just before the teachers arrived.

The original center also included a dock, a T-Craft outboard, a crab shanty, and four locally built wooden skiffs. In other words, the facility was much like any other household and holdings on Smith.

But conservative island villages can take time to adjust to newcomers, especially long-haired young men. Local watermen suspected Goldsborough was a game warden working undercover. Why else would someone use binoculars if not to spy for illegal duck hunting?

Looking back, Goldsborough recalled it was a comical twist that helped improve relations. The CBF had purchased some marshland from elders Paul and Ullie Marshall, thinking that being landowners might improve the organization's standing. It probably provoked only more head-scratching. Who buys marshes?

But Paul Marshall introduced Goldsborough around town. Also, the children of the island immediately took to the program. Curious, they often peered through the center windows. They welcomed the new children. Gradually, the foundation and Smith Island began to get acquainted.

Since 1978, more than 93,600 students, teachers and principals have visited the Smith Island facility, usually staying several days. The education center has been expanded to include two homes.

In the same time, more than 84,100 participants have participated in the Baltimore program. Students spend a day aboard Snow Goose, a former authentic Chesapeake workboat converted into a floating classroom. Snow Goose replaced Osprey, the original craft commissioned for the Baltimore operation.

The philosophy of the programs remains true: Educate students about the Bay by immersing them in it. Give them a deep and powerful experience of place and culture. As part of that study, the participants paddle canoes, conduct experiments from the deck of a workboat, interview local residents and more. They put down their mobile devices and pick up seine nets. They explore and see awe-inspiring sights: a heron rookery on a remote island, brilliant stars in a vast dark night, a sea horse on an oyster reef.

> *From its earliest days, the CBF realized that saving the Bay would take decades.*

From its earliest days, the CBF realized that saving the Bay would take decades. Educating young people to carry the mission forward in subsequent generations became a core objective. (I, for instance, got my start at the foundation as a high school student visiting the Smith Island center.)

Today, the CBF Education Department is nationally recognized. It operates 15 education programs in Virginia, Maryland, Pennsylvania, and the District of Columbia. Smith Island is one of four facilities for multi-day education experiences, and Baltimore is among 11 programs for single-day experiences. A small fleet of power boats, and even one authentic skipjack, help participants get out on the water, in addition to canoes. In all, about 34,000 students, teachers and principals participate in the programs each year, learning about the Bay, its tributaries and its challenges.

The CBF is still on the cutting edge of environmental education. It took a lead role in the No Child Left Inside Coalition in 2006, pushing back against the "teach to the test" approach. It also was a leader in the successful effort to make environmental literacy a high school graduation requirement in Maryland. The organization helped implement that regulation by fostering curriculum development. Furthering that success, all of the Bay states and the District of Columbia agreed to develop a comprehensive and systemic approach to environmental literacy for all students.

The CBF's most recent educational innovation is its Student Leadership program. It provides an opportunity for students to not only experience and understand the Bay and its issues, but to lead others in actions to restore clean water.

For example, the CBF's Pennsylvania Student Leadership Council created an advocacy campaign to make the Eastern hellbender the official state amphibian. The campaign resulted in state legislation and an article in the *Wall Street Journal.*

Many of those student leaders initially were inspired to help the Bay after a field experience on Smith Island or at other CBF outdoor programs. The magic of immersion is still at work.

Tom Ackerman is the Chesapeake Bay Foundation's vice president for Education.

Forum

Commentary • Letters • Perspectives

Groups would rather fight for the Bay than fight for funding

By Chanté Coleman

The four-part series, *The Bay's Pollution Diet: Is it Working?*, highlighted many aspects of the state of the Chesapeake Bay restoration effort.

We agree that we are witnesses to incredible progress, including the resurgence of Bay grasses and improvements in water quality. We also agree that progress has been slower than anticipated. There are a few key considerations, though, that were not highlighted in the series.

We must remember that the Bay took centuries to become impaired, and it will take longer than a few years of work to restore it.

But it is cleaner, and much of this progress is due to the hard work of the nonprofit community. The more than 230 member organizations of the Choose Clean Water Coalition have played a major role in getting the restoration effort where it is today. From national nonprofits to local watershed groups, this community has installed countless on-the-ground restoration projects that protect local water quality, promote healthy communities and help the states meet their pollution reduction goals.

Projects like rain gardens and forest buffers are installed on a daily basis thanks to nonprofits combining their own fundraising efforts with the limited grant resources available. Our watershed's nonprofit community understands the connection between continued funding and progress for the Chesapeake.

They are also one of the reasons why this work continues to receive funding at all.

We cannot overlook the dramatic shift that occurred with the 2016 election. As a reminder, the Trump administration attempted to eliminate funding for the restoration effort.

Our members fought hard alongside our Congressional delegation to ensure $73 million in crucial funding continued to reach the U.S. Environmental Protection Agency's Chesapeake Bay Program, state and local governments, and nonprofit organizations.

What if we did not have to focus our resources to battle the new administration and keep the cleanup from shutting down? We could have spent the last two years working to increase, rather than preserve Bay funding; focused on getting more targeted funding in Pennsylvania; and taken other actions to accelerate our progress. This attempted reversal must be appreciated for the impact it had on the restoration effort, and it is likely to continue.

Nonprofit organizations are continually helping landowners to install rain gardens and streamside buffers and to take a variety of other stewardship actions. Many have also been vocal advocates to maintain federal funding for the regional Bay cleanup effort. (Dave Harp)

What do we do now?

If anything, the last two years have shown us that elections matter. Voting matters. The coalition and its members have fought hard to keep the Chesapeake Bay cleanup a bipartisan effort, and everyone needs to feel empowered to voice their opinions and concerns around the progress we are making.

Write to your congressperson or state or local legislator, sign a petition, or voice your opinion in person. We will continue to see progress if we work together toward our common goal: clean water.

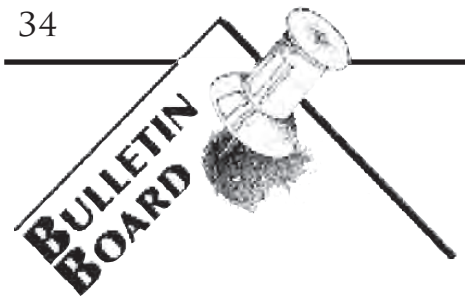
Chanté Coleman is director of the Choose Clean Water Coalition.

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

Kid's Christmas bird count

Children, ages 8 and older, can participate in the annual *Christmas Count* at Nixon Park near Jacobus, PA, 9–11:30 a.m. Dec. 27. Participants will join birding mentors from York (PA) Audubon, who will lead teams on hikes, explain binoculars, help identify birds and submit finds to eBird. Children must be accompanied by an adult. Register by Dec. 24 at 717-428-1961.

Eden Mill Nature Center

Eden Mill Nature Center in Pylesville, MD, is looking for volunteers, ages 5 & older (minors w/ adult) to help refurbish old bat boxes 9:30-11 a.m. Dec. 29. Register by Dec. 15. Call 410-836-3050 or email edenmillnaturecenter@gmail.com.

Become a VA Master Naturalist

Virginia's Fairfax and Merrimac Farm Master Naturalist chapters are accepting applications for January 2019 basic training courses. Master Naturalists are a corps of volunteers who manage and protect natural areas through activities such as plant and animal surveys, stream monitoring, trail rehabilitation and teaching in nature centers. Master Naturalist courses for new volunteers include ecology, geology, soils, native flora and fauna, and habitat management. Info: fairfaxmasternaturalists.org and merrimacfarmVMN@gmail.com, merrimacfarmvmn.weebly.com.

CBL Visitor Center

Volunteer docents, ages 16 and 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.

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 from the PWC Public Works Department in recognition of their stewardship. To learn more, adopt a stream or get a proposed site, visit waterquality@pwswcd.org. Groups can also register their events at trashnetwork.fergusonfoundation.org.

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 December, January and February at Little Paint Branch Park in Beltsville. Learn about native plants. Sign in for a safety orientation. Gloves and tools are provided. Info: Marc Imlay at Marc.Imlay@pgparks.com, 301-442-5657.

Cromwell Valley Park

Cromwell Valley Park near Towson, MD, needs volunteers for *Habitat Restoration Team / Weed Warrior Days:* 2–4 p.m. Dec. 15 and Jan. 16, 26 & 30 and Feb. 6, 9, 23 27. All ages (12 and younger w/adult) are welcome. Remove invasive species, install native plants and maintain restored habitat. Service hours are available. Meet at Sherwood House parking lot. No registration is required. Info: Laurie Taylor-Mitchell at ltmitchell4@comcast.net.

Magruder Woods

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

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.–12 p.m. Wednesdays. All ages (16 & younger w/adult) are welcome. Training, tools and water are provided. Preregistration is required. Info: 410-414-3400, acltweb.org, landmanager@acltweb.org.

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 December, January and February remove invasive plants at Ruth Swann Park in Bryans Road. Meet at Ruth Swann Park-Potomac Branch Library parking lot. Bring lunch. Info: Marc Imlay at 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: Laurel Imlay at 301-277-7111.

Snap a stream selfie

Water quality in 80 percent of U.S. streams is unknown. Help to bridge the information gap by taking a selfie in one's backyard or nearby stream. Info: iwla.org/streamselfie.

Count birds at Nixon Park

Nixon County Park near Jacobus, PA, needs volunteers for the Cornell Laboratory of Ornithology's Project FeederWatch, a citizen science program in which participants count the number and identify species of birds visiting feeders from November through early April. Volunteers commit to a one-hour time slot on Tuesday or Wednesday every other week. Data is forwarded to Cornell for its nationwide project that tracks winter bird population trends. Beginners are welcome. The park is ADA accessible. Info: Andrew at 717-428-1961.

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.

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.

Resources

Land & water conservation grants

The Maryland of Department Natural Resources is seeking local proposals from counties and municipalities for *Public Outdoor Recreation Projects* for grant funding from the National Park Service's *Land and Water Conservation Fund*. Projects must be in direct support of public outdoor recreation. Eligible proposals include the acquisition, development and maintenance of outdoor recreational areas, facilities and properties, including athletic fields, boat launches, fishing piers, playgrounds, trails and more. Municipalities and counties are eligible for up to a 50 percent matching fund with requests capped at $800,000. Preliminary application forms are due by Dec. 18. Info: dnr.maryland.gov/land/Pages/LWCF-Grants.aspx.

Impacts of plastic

These websites offer information about plastic pollution:

- *Impacts of Plastics:* Visit epa.gov/trash-free-waters for an EPA Trash Free Waters program webinar by Dr. Chelsea Rochman, a leading expert on the effect of human litter, as well as information on the movement and sources of aquatic trash, impacts of mismanaged trash, toxicological threats of plastic and case studies, preventing trash at the source, best management practices, policies & programs, trash-free waters projects, international initiatives, statutes & regulations, the Clean Water Act & Trash-Free Waters, Unpackaging your life and the Marine Debris Campus Toolkit.
- *When Did We Become a Plastic Society?* This trash awareness video is available at youtube.com/watch?v=dq5oXEVW07k.
- *Plastic Fibers in Drinking Water:* Visit orbmedia.org/stories/Invisibles_plastics/? to learn about a recent study that found 94 percent of tap water sampled in the United States contained micropolastic fibers, (although the significance to human health is not well understood).

Virginia Water Radio

Visit virginiawaterradio.org for audio files featuring sounds and

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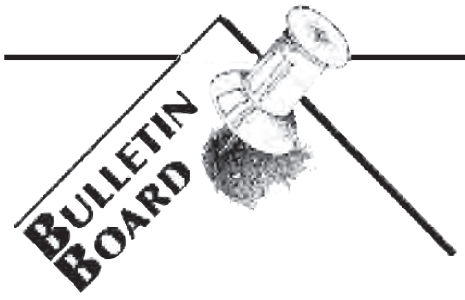

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music that relate to Virginia's waters, from the Cumberland Gap to the Atlantic Ocean. Virginia Water Radio is produced by the Virginia Water Resources Research Center, which is solely responsible for the show's content.

Creek Critters App

The Audubon Naturalist's Creek Critters App empowers people to check on the health of their local streams through finding and identifying the small organisms — or creatures — that live in freshwater streams, then generating stream health reports based on what they find. The free app can be downloaded from the App Store and Google Play. Info: anshome.org/creek-critters. To learn about partnerships or host a Creek Critters event, contact cleanstreams@anshome.org.

MD tree nursery accepting orders

The Maryland Department of Natural Resources is accepting online orders for shrub and tree seedlings from the John S. Ayton State Forest Tree Nursery for the spring 2019 planting season. The nursery offers more than 50 species of shrubs and trees for large-scale plantings on private land to meet a wide variety of conservation, environmental and reforestation needs. It also offers 20 different "pollinator friendly" options. A minimum order of 25 seedlings per species is required; supplies are limited. Info: Google John S. Ayton State Forest Tree Nursery.

Watershed education capsules

Prince William (VA) Soil and Water Conservation District's watershed capsules, which teach students about the important functions of watersheds, are available, first-come, first served. Info: pwswcd.org/educators, education@pwswcd.org.

Environmental education grants

EcoTech Grants offer up to $2,500 to engage children in inquiry-based, STEM-related projects that leverage technology and/or use nature-based design to address environmental problems in local communities. This cycle's application deadline is Jan. 15, 2019. Info: captainplanetfoundation.org/grants/ecotech.

Park passes for 4th graders

The Maryland Department of Natural Resources is partnering with the U.S. Department of the Interior's *Every Kid in a Park* program to provide fourth-grade children and their families free admission to national public lands and state parks. The Maryland Park Service will honor the federal passes, valid through Aug. 31, 2019, at all 75 state parks. The passes are also valid at 16 national parks, six national natural landmarks, five national wildlife refuges and two federal heritage areas in the state. The program's goal is to increase access to public lands and facilities for children at an impressionable age to ignite their interest and love for the outdoors. It also offers teachers resources for planning field trips, including free access for classes and eligibility for federal transportation funding. In addition, the DNR offers educational resources for teachers. The pass covers admission, but does not cover amenities and services, such as boat rentals, camping or staff-led tours. For details or to print a pass for this year, google *Every Kid in a Park* and follow the directions on the website.

Wildlife education trunks

The Maryland Department of Natural Resources is offering a variety of wildlife education trunks for use by teachers, homeschool educators, naturalists, scout leaders and other instructors. These free interdisciplinary tools are designed to interest students in local wildlife while building on disciplines like art, language arts, math, physical education, science and social studies. Each trunk contains an educator guide with background information, lesson plans and hands-on K–12 activities, as well as activity supplies, books, furs, replica tracks and videos. Trunk subjects include aquatic invasive species, bats, black bears, furbearers, white-tailed deer and wild turkeys. Trunks are available at seven locations around the state and can be borrowed on a first-come, first-served basis for up to two weeks. Info: Google Wildlife Education Trunks.

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 for county residents' yards to help them certify their landscapes as Bay-Wise. The Master Gardeners look for healthy lawn maintenance, efficient watering and pest control, and native trees and plants that provide shelter and habitat for wildlife. They also suggest approaches to reduce pollution. Free *Bay-Wise* signs are given to homeowners who demonstrate sound 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 as *Bay-Wise*, though, homeowners need to have the Master Gardeners visit and evaluate their landscape. Contact: Esther Mitchell at estherm@umd.edu or visit extension.umd.edu/baywise/program-certification. Click on "download the yardstick" to evaluate a landscape and/or vegetable garden.

Marine debris toolkit

The National Oceanic and Atmospheric Administration's Office of National Marine Sanctuaries and the NOAA Marine Debris Program have developed a toolkit for students and educators in coastal and inland areas to learn about marine debris and monitor their local waterways. This toolkit is a collaborative effort to reduce the impact of trash on marine ecosystems through hands-on citizen science, education and community outreach. Info: Google marine debris monitoring toolkit for educators.

Bilingual educator resources

Bilingual lessons are available in English and Spanish for Interstate Commission on the Potomac River Basin educational programs. Info: potomacriver.org/resources/educator.

Turf / lawn programs

For information on the Prince William *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 or e-mail bestlawns@pwcgov.org.

Stormwater management info

Businesses and nonprofits interested in landscaping and turf management, stormwater pond management, wildlife concerns, recommendations for maintaining landscapes, protecting water quality and pollution prevention can call 703-792-6285 to schedule a free site visit.

VA water monitoring test kits

The Virginia Department of Environmental Quality is distributing a limited number of water monitoring kits to test for dissolved oxygen, pH, turbidity and temperature. These kits are available for free to schools and organizations that do not have water monitoring equipment. The DEQ requests that participants use these kits as part of the *EarthEcho Water Challenge* (formerly known as World Water Monitoring Challenge. See worldwatermonitoringday.org). Groups with their own monitoring equipment can also participate in the event. Teachers, or those who work with a large number of students, can request a free kit. Contact: Stuart Torbeck at charles.torbeck@deq.virginia.gov and provide a mailing address, the

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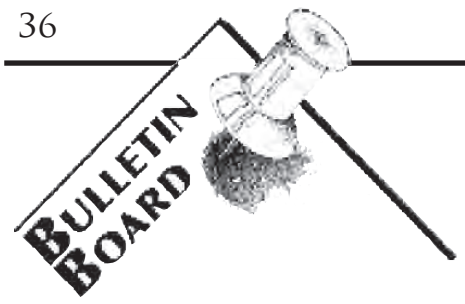
New Submission Guidelines

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. Items published in *Bulletin Board* are posted on the online calendar; unpublished items are posted online if staffing permits. 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.
- **January/February issue: December 11**
- **March issue: February 11**



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number of monitoring locations and the number of participants from the organization or school expected to participate in the EarthEcho Water Challenge. This information helps to determine how many kits a group needs. The Virginia Water Monitoring Council provided the kits for this effort.

Emerald ash borer program

The Virginia Department of Forestry's Emerald Ash Borer Cost-Share Program will help landowners and organizations (nonprofits, schools, homeowner associations, municipalities) treat ash trees to prevent their death by the emerald ash borer. Info: Meredith Bean at 434-220-9034, meredith.bean@dof.virginia.gov. To learn about the invasive insect, visit emeraldashborer.info. To participate in free webinars, visit emeraldashborer.info/eabu.php.

Bay Backpack

Provided by the Chesapeake Bay Program's Education Workgroup, the *Bay Backpack* is an online resource for educators with information about funding opportunities, field studies, curriculum guides and lesson plans related to the Chesapeake. Contact: baybackpack.com.

Baltimore biodiversity toolkit

The Baltimore Biodiversity Toolkit addresses the need for high-quality and accessible green space in the city, not only for native plants and animals, but for residents as well. It helps communities identify a suite of ambassador animals that represent habitat types within, and historic to, this area; shares practical resources for supporting specific wildlife needs; monitors and encourages the collection of citizen science data; and develops a culture of conservation and stewardship. The toolkit highlights 20 ambassador wildlife species from four different 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 is designed to 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.

MD 2019 state park passes

The Maryland Department of Natural Resources' 2019–2020 *Annual State Park and Trail Passport*, which provides unlimited day-use admission and boat launching at state parks, and a 10 percent discount on state-operated concessions and boat rentals is available. The annual passport is valid for a full year from the month of purchase, instead of by calendar year. (For example, a passport purchased in April 2019 will expire in April 2020. It comes in a self-contained packet with a detachable hang-tag for use in any vehicle. Proceeds from passport sales fund the operations and maintenance of state parks, including conservation, education and interpretation of cultural, historical and natural resources. Maryland's 75 state parks include more than 900 miles of trails for biking, hiking and horseback riding, water access and camping facilities. The cost is $75/MD residents and $100/non residents. Adults, ages 62 and older, can purchase a Golden Age Pass for $10 that provides a lifetime pass entitling them to free day-use entry and a complimentary boat launch as well as half-price camping Sunday through Thursday at state parks. Passes are available online at ShopDNR.com.

Forums / Workshops

Sustainable ag conference

Chesapeake Alliance for Sustainable Agriculture's *Growing Our Future Harvest: 20th Anniversary Conference* takes place Jan. 17–19 at the College Park Marriott, MD. The conference for beginning farmers, foodpreneurs and educators includes workshops; farm-fresh meals, speakers; networking; farmer-to-farmer chats; and seed, book and small tool swaps. Info: futureharvestcasa.org/conference.

Events / Programs

CBEC School's Out Camp

The Chesapeake Bay Environmental Center in Grasonville, MD, invites children to its *Winter Wonderland School's Out Camp* 9 a.m.–3:30 p.m. Dec. 28 (after-care available until 5 p.m.) for a day of hands-on nature exploration and play. Activities include environmental lessons and games, hiking trails and exploring the woods, arts & crafts and healthy snacks. Participants must bring a lunch and water bottle and dress for the weather. Dress in layers and bring a change of clothes in case your child gets muddy. Details will be sent by email to all registrants a few days before the camp. Fee: $45. After-care is an extra $10. Preregister at bayrestoration.org/schools-out-camp. Info: email knelson@bayrestoration.org.

VA gardening classes

The Virginia Cooperative Extension Master Gardener volunteers and staff invites the public to it *Basics of Gardening Series* and *Vegetable Gardening Series* at the Haymarket-Gainesville Community Library in Haymarket, VA.

- *Basics of Gardening:* 1–4 p.m. Jan. 12, Feb. 16 & March 9. Learn the science behind gardening. Class focuses on research-based knowledge of plant and soil health; right plant, right place; plant profiles; pest management; and best practices for sustainable landscapes.
- *Vegetable Gardening Series:* 10:15 a.m.–1:15 p.m. Feb. 16, 23 & March 2 (snow date 3/23). Learn how to make, manage an organic garden from scratch.

Classes are free. Preregisration is required. Info: pwcgov.org/grow,master_gardener@pwcgov.org.

York (PA) park hikes

Upcoming hikes offered by the York County (PA) Department of Parks & Recreation, include:

- *Marshmallow Hike:* 9:30–11:30 a.m. Dec. 28 & 1:30–3:30 p.m. Dec. 29. Meet at Hidden Laurel Picnic Area's Pheasant Pavilion in Rocky Ridge Park, York. Stroll through the woods to search for signs of nature. Warm up with hot chocolate around a fire.
- *Last Hike of the Year:* 9:30–11 a.m. Dec. 30, Nixon Park, near Jacobus. Hike in the woods and meadows along the Old Field Trail. Later, sip hot chocolate while gazing out of the nature center's viewing windows.

All of the walks are free. Preregistration is required. Info: 717-428-1961.

Chesapeake's rays & sharks

The Annapolis Maritime Museum invites the public to *Sharks and Rays of Chesapeake Bay: Proving "Common Knowledge" Wrong* at 7 p.m. Jan. 10. The lecture by John F. Morrissey of Sweet Briar (VA) College is part of the museum's winter lecture series. Admission is $10. Registration is not required; pay at the door. Info: M. K. Richardson at 410-295-0104 x3, development@amaritime.org.

Help restore a 1912 river tug

The Chesapeake Bay Maritime Museum is inviting the public to help restore the 1912 river tug, Delaware, this winter and spring through its *Apprentice for a Day Program*. Participants work side-by-side with CBMM shipwrights and learn the fundamentals of boat-building during this stem-to-stern restoration. Work days are scheduled 10 a.m.–4 p.m. on select dates beginning Jan. 12–13. Work will begin on Delaware's keel, stem and horn timber in early 2019, then progress to framing and planking in the latter half of the year. Work on deck structures will follow, with the project anticipated to take two years. Built in Bethel, DE, by William H. Smith, Delaware once hauled scows on Broad Creek — often laden with lumber — and towed ram schooners to and from Laurel, DE. Participants can sign up for a single day for $50, a full weekend for $90, or two full weekends for $170. To register online, or for information, visit cbmm.org/shipyardprograms. To follow this restoration or other shipyard projects, visit cbmmshipyard.org, where progress reports, photos and videos will be posted.

Anita Leight Estuary Center

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

- *DIY Snow Globes:* 11 a.m.–12 p.m. Dec. 15. Ages 4+ Fee: $5/project.
- *Holiday Wreath-Making Workshop:* 2–4 p.m. Dec. 15. Ages 8+ Materials, refreshments provided. Fee: $10/project.
- *Quartz Crystal Jewelry:* 1–2 p.m. Dec. 16. Ages 8+ Design, create a bracelet, necklace or earrings with quartz crystals. All supplies provided.

Bulletin continues on page 37

Chesapeake Challenge

Answers to

Night Moves

on page 38.

1. C 2. C 3. D 4. B 5. D
6. B 7. C 8. A

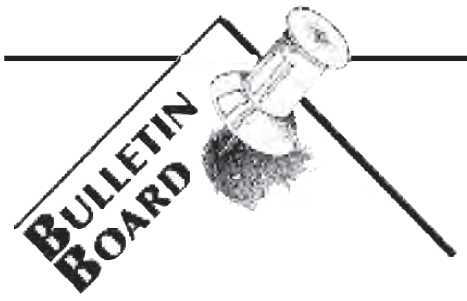
Bay Buddies

Answers to

Beddy Bye Beasties

on page 38.

1. C 2. D 3. Several times a day
4. Predator 5. A 6. B 7. D 8. A



Bulletin from page 36

Fee: $10/project.

≋ *Tails & Tots:* 3 p.m. Dec. 16. Ages 6 & younger. Listen to a story about an animal or habitat. Event may include meeting a live animal, a craft or acting out the story. Free. No registration.

≋ *Winter Solstice Celebration:* 2–3:30 p.m. Dec. 22. Ages 4+ Cozy up around the pellet stove to listen to a story, sip hot chocolate. Take a short hike to collect materials to create a solstice lantern for home. Fee: $3.

≋ *Full Moon Campfire:* 7–8:30 p.m. Dec. 22. Ages 3+ (15 & younger w/adult) Fee: $5. Winter is the best time for stargazing. View the full moon near a campfire to keep warm.

≋ *Holiday Open House:* 12:30–4:30 p.m. Dec. 23. All ages. Visit the naturalist, take holiday-themed photos with animals, snack on light refreshments. Free. No registration.

≋ *Meet a Critter:* 1 p.m. Dec. 23. All ages. Meet a live animal up close, learn what makes it special. Free. No registration.

≋ *Twiggy Creatures:* 11 a.m.–12:30 p.m. Dec. 29. Ages 4+ Enter the woods to search for wildlife, collect items to make a twiggy creature. Fee: $3.

≋ *Critter Dinner Time:* 1:30 p.m. Dec. 29. All ages. Watch turtles, fish, snakes eat while learning about them. Free. No registration.

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

Owl & kestrel program

The Patuxent Research Refuge near Laurel, MD, invites visitors of all ages to meet two of North America's smallest birds of prey, the American kestrel and Eastern screech owl, 12:15 – 12:45 p.m. Dec. 15 & 22 at its National Wildlife Visitor Center. Learn how the kestrel uses its acrobatic prowess, while the owl is a stealthy, silent hunter. The event is free, although donations are appreciated. Preregistration required. Info: 301-497-5887. For disability-related accommodations, notify the refuge, giving as much notice as possible. Info: fws.gov/refuge/Patuxent.

Cromwell Valley Park

Upcoming programs at Cromwell Valley Park near Towson, MD, include:

≋ *Trivia Trail Trek:* 10 a.m.–2 p.m. Dec. 16. All ages. Pick up a self-guided trail book, answer the trivia questions, return to the Nature Center for a prize! Free. Drop-in program; no registration.

≋ *Full Owl Moon Night Hike:* 5:30–7 p.m. Dec. 21. Ages 8+ Start with a short talk in the center, then go outside to search for "Mr. Hooty." Dress for weather. Fee: $4.

≋ *Wellington Woods Winter Walk:* 1–2:30 p.m. Dec. 22. Adults. Naturalist-led hike. Free.

≋ *Visit the Nature Center Day:* 11 a.m.–3 p.m. Dec. 23. All ages. Visit the animals, have a free cup of hot chocolate or coffee. Free. Drop-in program; no registration.

≋ *Law of Claw & Fang:* 1–2 p.m. Dec. 29. All ages. Learn about food chains, help feed the animals. Free. Drop-in program, no registration.

≋ *Debris Shelters:* 1–3 p.m. Dec. 30. This program takes place at Cromwell Valley's Primitive Technology Laboratory. Ages 10+ Learn how to make a winter debris shelter. Free.

≋ *Wintertime Natural Ornaments:* 1–3 p.m. Jan. 5. Ages 8+ Make wintery decorations using natural objects. Fee: $4.

≋ *Bread & Butter:* 1–2:30 p.m. Jan. 6. Ages 5+ Learn how to use a clay earth oven, make bread and butter. Fee: $5.

≋ *Polliwog Preschool Club:* 10:30–11:30 a.m. Tuesdays, Jan. 8 to Feb. 12 or 10:30–11:30 a.m. Wednesdays, Jan. 9 to Feb. 13. (Register for one series only.) Ages 2–5. Explore nature through hands-on activities, nature play, stories, crafts. Dress for the outdoors. Non-mobile siblings only; parent/guardian must be an active participant. Fee: $80 for six sessions. Registration for *Polliwog Preschool Club* can only be made on-line.

≋ *Winter Birding in the Valley:* 10 a.m.–12 p.m. Jan. 12. Adults. Hike with an expert birders. Bring binoculars. Free.

≋ *Animal Adaptations to Cold:* 1–2:30 p.m. Jan. 13. All ages. Learn where turtles, frogs, snakes go in winter Free.

Ages 12 & younger must be accompanied by an adult. Except where noted, preregistration is required for all programs. To register online, visit cromwellvalleypark.campbrainregistration.com. Info: info@cromwellvalleypark.org, cromwellvalleypark.org, 410-887-2503. For disability-related accommodations, call 410-887-5370 or 410-887-5319 (TTY), giving as much notice as possible.

Eden Mill Nature Center

Upcoming events at Eden Mill Nature Center in Pylesville, MD, include:

≋ *Birds in Your Backyard:* 1–2:30 p.m. Dec. 16. Ages 6+ Learn to identify birds at winter backyard feeders. Make a suet bird feeder to attract birds at home. Bring a mug to use for the craft. Fee: $5.

≋ *Preschool Nature Series:* 10–11 a.m. Dec. 18 (*Solstice Celebration*) Jan. 8 (*Migration - On the Move*) Ages: 2–5. Programs include nature games and activities, story, craft, hike. Fee: $10 per session.

≋ *Winter Hiking Series: Sounds of Winter:* 4 p.m. Dec. 26. All ages. Learn about birds that live at Eden Mill year-round. Fee: $3.

≋ *Cocoa & Snow:* 4 p.m. Jan. 2. Ages: 4+ Learn how snow is made, make a snowflake to take home, sip hot cocoa, read a story. Fee: $5. Register by Dec. 19.

≋ *JR Scientist / Homemade Lava Lamp:* 4:30 p.m. Jan. 4. Ages 5–14. Learn about density while making homemade lava lamps. Fee: $4. Register by Dec. 21.

≋ *Historic Grist Mill Tours:* 10 a.m. or 2 p.m. Jan. 7 & Feb. 11. All ages. Guided tour. Fee: $3

≋ *Fly Tying for Fly Fishing:* 7–8:30 p.m. Jan. 8. Ages 8+ Members of a local fly fishing group will offer instruction, guidance on popular fly patterns for all experience levels. Materials, equipment/tools provided for those who do not have their own. Fee: $5.

≋ *Homeschool Social Studies / You Say You Want a Revolution:* Series meets 12:15-2 p.m. Jan. 10, 17 & 24. Ages: 6–12, parents do not attend. Learn how the Industrial Revolution affected children with an emphasis on the milling industry. Fee: $30 for series.

≋ *Tweet Treats:* 4:30 p.m. Jan. 10. Ages 6+ Learn about local birds, make a treat to hang outside your window. Fee: $8. Register by Dec. 27.

≋ *Winter Wildlife Hike:* 10–11:30 a.m. Jan. 12. All ages. Wander through the woods to explore habitats, search for signs of activity. Dress for weather. Fee: $5.

Minors must be accompanied by an adult for all programs unless otherwise specified. Preregistration is required for all programs. Call 410-836-3050 or email edenmillnaturecenter@gmail.com. Registration closes 24 hours in advance of program. Weekend program registration closes at noon on the prior Friday.

Naturalist from page 40

Reduce, Dispose of Chemicals Properly

≋ Never pour household chemicals down drains. Read the labels to learn how to properly dispose of chemicals.

≋ Fight weeds and insects with products that contain plant-derived, nontoxic ingredients. Make insect repellents using common household items like garlic, vinegar and cooking oil.

≋ Contact your local government office to find out about recycling as well as programs for household hazardous waste disposal.

Reduce Waste

≋ Recycle your mobile phone, personal computer and other electronic devices.

≋ Leaves don't have to end up in the landfill or the burn pile. Instead, consider mulching, composting or curbside collection.

≋ Plan meals to reduce food waste.

≋ Go paperless.

≋ Use local recycling programs.

Reduce Car Use

≋ Reducing car use will decrease the amount of nutrients & toxic substances flowing into storm drains.

≋ Plan trips to minimize miles driven.

≋ Combine errands to avoid unnecessary trips.

≋ Use public transportation, bicycle or walk when possible.

≋ Join a carpool or ride-sharing program.

≋ If possible, telecommute to work.

≋ Purchase fuel-efficient automobiles.

Maintain Car

≋ Maximize fuel efficiency by keeping a car maintained and properly inflating tires. On average, tires lose about 1 psi per month and 1 psi for every 10-degree drop in temperature.

≋ Clogged air filters can cause up to a 10 percent increase in fuel consumption.

≋ Avoid unnecessary idling. Most new cars do not need to be warmed up. Unnecessary idling wastes fuel, costs money and pollutes the air.

≋ Fix car leaks so engine fluids like oil and antifreeze don't drip onto the ground and run off into waterways.

≋ Dispose of used motor oil and antifreeze at a gas station or a landfill with an oil-recycling program.

≋ To learn more about how you can make a difference, look up these organizations on the internet: Alliance for the Chesapeake Bay, Chesapeake Bay Foundation, Chesapeake Bay Native Plant Center, Chesapeake Bay Program, U.S. Department of Energy.

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

Night Moves

Let's call it a night. For many, this means the day's activities are done and it's time for rest. Yet for many of Earth's inhabitants, activity is just beginning. This quiz will test you on how much you know about nocturnal creatures. Answers are on page 36.

1. Approximately what percent of mammals are nocturnal?

A. 50 percent
B. 60 percent
C. 70 percent
D. 80 percent

2. The ability to see in the dark is important. Many nocturnal animals have larger eyes and pupils to allow more light to get in. Also, their retinas are almost entirely composed of rod cells, which can capture even the tiniest bit of light. Their retinas contain fewer cone cells than animals that are active in the day. What do cone cells detect?

A. Depth perception
B. Movement
C. Color
D. Clarity

A raccoon sleeps in a pecan tree. Raccoons are primarily nocturnal. (Dave Harp)

3. Many nocturnal have a tapetum lucidum in their eyes. (Humans do not.) What does a tapetum lucidum do?

A. It is a tissue at the back of the eye that reflects light for better vision in low-light situations.

B. It causes the eyes of some animals, such as cats, glow in the dark.

C. It is a tissue at the back of the eye that allows animals to collect ultraviolet light in the dark.

D. A & B

4. A heightened sense of smell is also present in most nocturnal animals. Many amphibians and reptiles, as well as some mammals (but not humans), have a Jacobson's organ, which can detect scent on moist air. Where is this organ located?

A. In their nostrils
B. In the roof of their mouths
C. In a small pit in each cheek
D. In their ears

5. Many small birds, even those usually active during the day, will migrate at night. Why?

A. The air is less turbulent.

B. They use the stars to navigate.

C. They can use the same routes as birds of prey, which, as a rule, must migrate while the sun is out to take advantage of daytime thermal currents to soar.

D. All of the above.

6. Many birds sing at night. Which of these is not a reason?

A. To mark their territory

B. To make it difficult for nearby predators to sleep

C. To attract mates

D. There is less background noise, so their song carries farther.

7. Nocturnal fish, in general, have behaviors and physical features that differ from those of diurnal fish. Which of these is not true?

A. They are more likely to be solitary and carnivorous.

B. They tend to not swim as fast as diurnal fish.

C. They tend to have smaller eyes.

D. They are more likely to be yellowish brown or red. As light levels drop at night, these are the first colors on the spectrum to become imperceptible.

8. As far as scientists can tell, plants do not sleep. Even so, they are creations of habit, and many of their life processes can be tied to either day or night. During the day, they use the sun's energy to turn water, minerals and carbon dioxide into sugars (food) during a chemical process called photosynthesis. What do they do at night?

A. The sugars move to different parts of the tree, where they are "consumed."

B. Their roots release excess sugar and water into the soil.

C. They use moonlight to store this energy into food reserves for the winter.

D. They turn this energy into a pesticide.

— Kathleen A. Gaskell

Did you ever wonder what goes on in an animal's brain or body while it is sleeping? Take this quiz to learn about a few animals' sleeping habits. Answers are on page 36.

1. Dolphins swim while they sleep. How do they manage this?

A. Dolphins sleep in shifts, and those that are awake poke the sleeping ones if they start to sink.

B. Dolphins only sleep for a minute at a time, which is not enough time for a dolphin to drown.

C. Dolphins can turn off half their brain, and the other half lets it know when it is time to come up for air. Not only that, but they keep one eye open to keep a lookout for predators.

D. Dolphins don't sleep.

2. Why do brown bats — which can sleep 12–19 hours at a time — sleep upside down from the ceiling?

A. It causes blood to flow to the brain, which keeps the bat alert to danger, even while sleeping. Plus, the bat's muscles are most relaxed in this position.

B. They are less likely to be spotted by prey there.

C. It's easier for a bat to take off flying from this position. In fact, their wings aren't strong enough to take off from the ground.

D. B & C

3. If you are a mammal, are you more likely to sleep once a day or several times a day?

4. Some animals sleep out in the open; others hide when sleeping. Which type of animal is more likely to sleep out in the open, a predator species or a prey species?

5. Why do some birds sleep with their bills (which contain their nose openings, called nares) tucked under their shoulders or backs?

A. It warms the air that the bird breathes, should temperatures get cold at night.

B. It deadens the sound of a bird's whistling or snoring in its sleep, making the bird's location less obvious to predators.

C. The position stretches out the bird's neck muscles, which tighten up when the animal is awake.

D. The bird's breath forces out any parasites that might have burrowed under its feathers.

6. Why do wading birds like herons and egrets stand in water while they sleep?

A. The water cools off their feet, which reduces their body temperature and helps the birds to sleep better.

B. They can sense approaching predators through sounds and vibrations in the water.

C. The sounds and vibrations in the water lull them to sleep.

D. They might fall out of a tree during a deep sleep.

7. Smaller birds (whose feet can clamp around a branch so they don't fall out of the tree while sleeping) tend to perch close to the tree trunk, high up in a tree when they sleep. Why?

A. The trunk provides better shelter than an outer branch.

B. The trunk may still hold warmth from the day's sun.

C. Predators climbing the tree will cause vibrations and noise, alerting the bird in time to escape.

D. All of the above.

8. Why do fish sleep with their eyes open?

A. Unless they are a shark, they don't have eyelids.

B. Their eyelids are transparent, so it only looks like they are not sleeping.

C. They don't want to miss out on any nearby action.

D. Their eyes help them blend in better with their surroundings.

— Kathleen A. Gaskell

Saltmarsh sparrow needs tide to turn in its favor if it is to survive

By Mike Burke

Chesapeake marshes in the winter have a special charm. An extraordinary range of warm brown, ocher and russet tones lend the grasses a hypnotic quality. At this time of the year, I tend to focus my attention on the Chesapeake's bountiful waterfowl. But the marsh grasses are always there, adding a backdrop of ineffable beauty to any visit.

We were in the Blackwater National Wildlife Refuge in Dorchester County, MD. Our attention turned from the snow geese to the simpler pleasure of scanning the marsh for songbirds.

The LBBs — little brown birds in birding lexicon — are always there, camouflaged among the scrub and grasses. There were song sparrows, wrens, Savannah sparrows and lots of white-throated sparrows.

My focus turned to another sparrow, comically stretched between two reeds, with tiny feet firmly grasping the separate stalks.

While this bird had a white throat patch, it also had a bright orange eyebrow and similarly colored malar (moustache) region forming a triangle on each side of the head.

The bird's body and flight feathers were typical of sparrows, a mix of blacks, browns and whites. It had a streaked buffy breast band and heavily streaked sides. I was watching a saltmarsh sparrow (*Ammospiza caudacata*).

Saltmarsh sparrows are closely related to Nelson's sparrow. Until recently, the two species were considered one, called sharp-tailed sparrows. The new name is perfect. These sparrows inhabit a narrow band where the tide turns and are the only songbird restricted to the tidal salt marshes of the Atlantic.

During the winter, saltmarsh sparrows can be found from the lower Chesapeake to Florida and across the upper Gulf Coast.

In early spring, they head north where they breed from the mouth of the Chesapeake all the way up to Maine.

Saltmarsh sparrows tend to occur in discontinuous pockets, largely because their favored habitat is so fragmented.

While its range is extremely restricted, saltmarsh sparrow mating habits are nothing short of promiscuous. Females typically lay about four eggs per nest… and they average 2.5 different fathers per brood!

The wide-ranging males play a minor role in reproduction. It is the female who constructs the nest, broods the eggs and feeds the young.

Researchers band a saltmarsh sparrow at the Edwin B. Forsythe National Wildlife Refuge in New Jersey. (Chelsi Burns / U.S. Fish and Wildlife Service)

Nests are a simple open cup of grass built near the edge of the tide line. Spring high tides, especially around full moons, often inundate these nests. Females will quickly build new nests, which may face the same fate a month later.

Nestlings are fed a diet exclusively of arthropods (invertebrates such as adult and larval insects, tiny crustaceans, and spiders) plucked from tidal flats or while clinging to marsh grasses. After seeds set in late summer, saltmarsh sparrows add them to their diets. They favor cordgrass and spartina.

With their narrow habitat niche and frequent nest failures, saltmarsh sparrows are in steep decline. The population crashed 75 percent between 1998–2012. With a 9 percent decline annually, the species may be extinct in another 30 years without intervention.

The U.S. Fish and Wildlife Service is conducting a study to determine if the bird should be protected under the Endangered Species Act. A threatened or endangered listing can be a lifesaver: Just witness the rebound of the bald eagle. The act can be used to help save critical habitat as well as prioritize limited federal conservation dollars.

The habitat squeeze is especially acute in the Chesapeake region. For centuries, the land around the Bay has been sinking, as Ice Age geologic forces continue to be felt. Until recently, the subsidence has been mitigated by the natural addition of peat from dying vegetation in the wetlands. But climate change, sea level rise and increased storm severity are interrupting this cycle of renewal. As more and more humans develop property right up to the marsh's edge, the wetlands are unable to retreat naturally to higher ground.

Luckily for the saltmarsh sparrow, conservationists aren't waiting for an endangered species listing to take action. Audubon Maryland-DC is leading a host of government, nongovernmental organizations and private sector partners in a habitat restoration project just a few miles from where I stood.

The Audubon Society's Chesapeake chapter owns a 700-acre sanctuary nestled inside Maryland's Fishing Bay wetlands complex just south of Blackwater. The parcel has a natural depression that is now flooding, turning the area into an ever-expanding open water pond. Critical habitat for the saltmarsh sparrow — and similarly imperiled swamp sparrow — is disappearing.

Even as I watched the saltmarsh sparrow at Blackwater, the coalition was busy altering the hydrology of the nearby site to let the pooled water flow away into adjacent tidal creeks. The Audubon-led partnership hopes to demonstrate one way to preserve essential habitat in the face of climate-driven sea level rise.

Conservationists around the country are investigating a wide array of management interventions to save our marshes and the birds that rely on them. This project is among the most innovative.

I continued to watch the saltmarsh sparrow precariously balance between two reeds. All I could think was: hang on! And hope for the help that is on the way.

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

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Gifts for the holidays, resolutions for the New Year!

BY KATHY RESHETILOFF

With the holiday season upon us, our attention turns to giving gifts to friends and family or ways to contribute to charities. Thoughts also turn toward New Year's resolutions as we look for ways to improve ourselves or our world. So this is a perfect time to reflect on how to reduce your impact on Earth by helping to conserve the air, water, land and wildlife that surround and sustain us. If you need a little help deciding what you can do, here's a gift list to choose from.

Conserve Water

≋ Using less water means that less water is treated in a sewage treatment plant or septic system.

≋ Fix leaky toilets and faucets.

≋ Take short showers instead of baths. Cutting your shower time by five minutes can save 10–12 gallons of water per shower.

≋ Turn off water when not in use while brushing teeth, shaving or washing dishes.

≋ Install a low-flow shower head.

≋ Run only full loads of laundry and dishes.

≋ Instead of asphalt or concrete, use porous surfaces like gravel or pavers to pave your driveway or patio.

≋ Pick up after your pet. Pet waste contains nutrients and bacteria that can wash into local waterways if left on the ground.

Practice Conservation Landscaping

≋ Plant native plants. Native plants provide food and homes for native wildlife and generally require less overall maintenance.

≋ Decrease the size of your lawn. Replace it with shrubs, trees, gardens or meadows.

≋ If you must water your lawn or outdoor plants, do so in the early morning. Water evaporates in the heat of the day.

≋ Try safer alternatives for controlling pests. If you must buy toxic products, choose the least toxic product you can find and never buy or use more than you need.

≋ Instead of chemical weed killers, try nontoxic alternatives like soap, salt or vinegar. Pull or dig up weeds. Learn to live with them.

Barks for the Bay: Pick up after your pet. Pet waste contains nutrients and bacteria that can wash into local waterways and eventually the Chesapeake if left on the ground. (Kathy Reshetiloff)

≋ Start a compost pile to reduce your carbon footprint and put organic waste to work feeding household and garden plants.

≋ Protect the soil below your gutter downspout by using drainage tiles or splash blocks to redirect and slow stormwater. Or, direct downspout flows into rain barrels, rain gardens or a permeable layer of rocks.

Protect Waterways

≋ Keep sewage in a portable toilet or holding tank on your boat. Dispose of it only at an approved pump-out facility.

≋ Thoroughly clean your boat's hull and all fishing gear before moving to another body of water to prevent the movement of invasive aquatic plants and animals.

≋ Stow and secure used bags, bottles, fishing lines and other trash on your boat so litter doesn't fall into the water.

≋ Never dump bait or aquarium species into a storm drain or body of water

≋ Follow speed limits and no-wake laws to avoid churning up sediment or eroding nearby shorelines.

≋ Steer clear of Bay grass beds to avoid harming this critical habitat and food source.

≋ Don't pour expired or leftover drugs down the sink or flush them down the toilet. They can end up in local streams and rivers. Instead, return unused medicine to a consumer drug return location.

Use Less Electricity

≋ Much of your home's energy is supplied by burning coal, which sends pollutants into the air

≋ If possible, set your thermostat to 68 degrees Fahrenheit in the winter and 78 degrees in the summer to cut down on energy use.

≋ Turn off lights and unplug appliances when not in use. For hard-to-reach outlets, plug devices into a power strip that can easily be switched off.

≋ Run dishwashers, washing machines and dryers only when full.

≋ Wash clothes in cold water.

≋ Hang your clothes outside to dry instead of using dryers.

≋ Buy energy-efficient appliances.

≋ Make sure your house is properly insulated.

≋ Replace incandescent, halogen and compact fluorescent light bulbs with energy-saving LED bulbs.

Maintain Septic Systems

≋ If you have a septic system, have it pumped out every three to five years. This will allow your septic tank to operate efficiently.

≋ Be careful not to flush or pour anything into your drains that will kill the bacteria that live in your septic tank. Healthy colonies of bacteria in your septic tank are necessary for the process that treats wastewater and reduces the nutrient inputs that reach groundwater.

≋ Don't use garbage disposals; they contribute unnecessary solids and grease to a septic system.

≋ Don't plant trees or shrubs near the drain field; their roots can clog drain lines.

≋ Distribute water-using activities throughout the week to avoid overloading the system on any given day.

NATURALIST CONTINUES ON PAGE 37