



Choptank Riverkeeper Matt Pluta often uses his Mavic Pro to illustrate land and water issues for ShoreRivers. (Dave Harp)

New 'air force' joins ranks of campaign to protect Chesapeake

✤ Drones are changing the way advocates protect and study the environment.

### BY WHITNEY PIPKIN

Riverkeepers, researchers and volunteer monitors have long kept an eye on water quality from the ground and from the river. But, with the help of technology that's suddenly far more accessible, they're taking to the skies, too.

Once reserved for military operations or tech-savvy hobby flyers, unmanned aerial vehicles, also called UAVs or drones, have recently become so affordable and easy to fly that they are winding up in the hands of more environmentalists.

Pipeline opponents and watchdog groups are a perfect example.

"The technology has come along to the point where everyday people can put a camera up in the air and see beyond the tree line or their property line," said Ben Cunningham, Virginia field



Upper Potomac Riverkeeper Brent Walls flies his DJI Mavic Pro over and near waterways he works to protect. He's added a GoPro camera, lighting, and water-landing gear to his equipment over the years. (Brent Walls)

coordinator for the Pipeline Compliance Surveillance Initiative, a program that is training volunteers to use drones to keep tabs on controversial natural gas pipeline construction projects. With the help of this equipment, he said, they've created an oversight system that is often "superior to what regulators have at their disposal."

The Federal Aviation Administration predicts that about 7 million hobby and commercial drones will be sold in 2020 — nearly three times the 2.5 million sold in 2016.

The fast-growing fleet of drones includes small, sophisticated airplanes and quadcopters that, in some cases, are as easy to pilot as a remote-controlled car. Outfitted with autopiloting functions and the ability to record images through a smartphone screen, some basic models start at less than \$200, with advanced versions beginning around \$1,000.

In the Chesapeake Bay watershed, volunteers are getting licenses for drones in order to track the construction of natural gas pipelines. Researchers are using them to measure the growth

**DRONES** CONTINUES ON PAGE 26

### ASMFC expected to set stricter regs for harvesting striped bass

Stock assessment finds outlook for species is bleaker than expected.

### BY KARL BLANKENSHIP

A new status review has found the striped bass population to be in worse shape than previously thought, a result that will almost certainly trigger new catch restrictions for the prized species next year in the Chesapeake Bay and along the East Coast.

A preview of a soon-to-be-released stock assessment presented in February to the Atlantic States Marine Fisheries Commission indicates that the striped bass population is overfished and has been for several years.

Members of the commission, a panel of East Coast fishery managers, knew that the migratory species has been in coastwide decline for more than a decade, but the new assessment paints a bleaker picture than many expected, including data that show recreational catches are significantly higher than previously estimated.

"We had all hoped that the results of the assessment would be a little better," said Mike Luisi, an estuarine and marine fisheries manager with the Maryland Department of Natural Resources. "It is clear that we need to do something."

Once the ASMFC officially accepts the new stock assessment, it will need to implement a plan within a year to end overfishing.

The commission can't adopt the assessment until its May meeting, though. Its completion was delayed by the partial federal government shutdown, which sidelined biologists with the National Marine Fisheries Service who were working to complete both the final document and the peer review report.

In the meantime, the ASMFC's Striped Bass Management Board has asked its technical advisers to estimate the amount of catch reductions that will be



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> Karl Blankenship, Executive Director Andrew Nolan, CPA, Chief Financial Officer

#### STAFF

CONTACT US

*by mail:* The Bay Journal 619 Oakwood Drive Seven Valleys, PA 17360-9395

*by phone:* 717-428-2819

To inquire about advertising, contact Jacqui Caine at 540-903-9298 Editor: Karl Blankenship (kblankenship@bayjournal.com) Managing Editor: Lara Lutz (llutz@bayjournal.com) Associate Editor/Projects: Timothy B. Wheeler (twheeler@bayjournal.com) Bay Journal News Service Editor: Tim Sayles (tsayles@bayjournal.com) Copy/Design Editor: Kathleen A. Gaskell (kgaskell@bayjournal.com) Staff Writer: Jeremy Cox (jcox@bayjournal.com)

Staff Writer: Donna Morelli (dmorelli@bayjournal.com) Staff Writer: Whitney Pipkin (wpipkin@bayjournal.com) Staff Writer: Sarah Vogelsong (svogelsong@bayjournal.com) Photographer: Dave Harp (dharp@chesapeakephotos.com)

#### ADVERTISING

Marketing & Advertising Director: Jacqui Caine (jcaine@bayjournal.com)

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#### **Editor's Note**

### Conservation leaders Boesch, Coble join Bay Journal board



welcome two conservation leaders with extensive backgrounds in the Chesapeake region — Donald Boesch and Kim Coble — to Bay Journal Media's board of directors.

It is my pleasure to

Donald Boesch is president emeritus of the University of Maryland Center for Environmental Science, which he headed from 1990 to 2017 and is a fellow with the Walton Family Foundation. He is one of the nation's most recognized and experienced experts in the application of science to form policies for the protection, sustainable use and restoration of coastal ecosystems and for adaptation to climate change.

Boesch has conducted or facilitated research on the Bay for more than 35 years and has been an official adviser to federal agencies, the Chesapeake Bay Program and five Maryland governors. A biological oceanographer, he has researched coastal and continental shelf environments along the Atlantic Coast, the Gulf of Mexico, eastern Australia and the East China Sea. He has published two books and nearly 100 papers on marine benthos, estuaries, wetlands, continental shelves, oil pollution, nutrient overenrichment, environmental assessment and monitoring, and science policy.

A native of New Orleans, Boesch served as the first executive director of the Louisiana Universities Marine Consortium from 1980 to 1990 and was a professor of marine science at Louisiana State University. He received a B.S. in biology from Tulane University and a Ph.D. in oceanography from the College of William and Mary, and he spent eight years as a faculty member at the Virginia Institute of Marine Science.

Kim Coble is the chief operating officer with US SIF: The Forum for Sustainable and Responsible Investment, which advances sustainable, responsible and impactful investing. The nonprofit is seeking to shift investment practices to those that promote sustainability and generate positive social and environmental impacts.

Before joining US SIF, Coble spent 25 years with the Chesapeake Bay Foundation, where she served in several roles, including most recently as vice president for environmental protection and restoration, directing all policy, advocacy and restoration efforts. She is a graduate of Leadership Maryland and was named one of Maryland's Top 100 Women. She was also appointed by the Senate President to the Maryland State Ethics Commission.

Coble earned a B.A. in Biology from University of Puget Sound and a Master's of Science in Public Health in Environmental Health and Toxicology from University of Washington.

They join the other members of our board which, besides myself, include Board President Mary Barber, an environmental scientist with RTI International; Vice President Bill Eichbaum, senior fellow with the World Wildlife Fund; Treasurer Frank Felbaum, former director of Pennsylvania's Wild Resource Conservation Fund and former publisher of *Keystone Conservationist* magazine; and Tom Lewis, an attorney with Gallagher Evelius & Jones LLP in Baltimore and a former attorney with the Chesapeake Bay Foundation.

— Karl Blankenship

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### BAY JOURNAL • MARCH 2019



### WHAT'S INSIDE

#### News

- **5** Academy prepares citizens to lead the way in Bay cleanup • Master Watershed Stewards' projects range from training others or installing rain barrels to complex stream restorations
- 8 Seismic surveying proposal in Atlantic raises Bay concerns • Groups say 250-decibel blasts – 10 seconds apart for months at a time – would have a detrimental effect on whales, other marine life
- **9** Year of extreme rain takes its toll on oysters in MD waters Influx of freshwater to the Bay killed off oysters in places, but helped survivors fend off disease
- 10 Exelon, MD spar over who is responsible for nutrients passing over dam • State, in relicensing conditions, seeks millions to address problems related to Conowingo
- 12 Ospreys, their fate once up in the air; soar again over the Chesapeake Bird's recovery offers hope for resurrecting other species in peril
- 13 Gas pipeline on shakier ground as legal challenges add up Construction of Atlantic Coast project grinds to a halt after courts reverse 3 federal permits
- 14 Saltwater intrusion laying waste to Delmarva farms as sea level rises • Researchers mapping rate of incursion and testing which crops perform best under these changing conditions
- **15 Cleaner coal ash gets bipartisan support in VA** Dominion must remove ash from impoundments at 4 sites for recycling or to be placed in safely lined landfills
- 16 Chicken-rendering plant expansion draws critics on Eastern Shore • Groups concerned about request to almost quadruple wastewater discharge under an 18-year-old permit
- 17 Tracking life in DC's urban streams has its ups and downs Volunteer monitors' joy in increased presence of eels and minnow and fly species offset by dwindling number of other creatures

- **18** James River grants to pay for riparian buffers, precision ag techniques Web-based app helped VEE decide which projects would be the most effective use of funds
- **19 Solar facility plan in Southern MD forest under fire** Two projects, one for Georgetown University, pose trade-offs between climate action, woodland conservation
- 20 VA won't be penalized over menhaden regs if it stays under cap • Move heads off legal showdown between state, ASMFC

### Travel

- 22 Seven Foot Knoll Lighthouse illuminates life in a screwpile
- 24 Tiptoe through the trilliums at Thompson WMA

### Columns

- 4 Alliance for the Chesapeake Bay Your local Project Stream Cleanup needs you this spring!
- **39** On the Wing Tricolored herons: Here today, but where tomorrow?
- **40 Bay Naturalist** Look around for signs of the season springing up around the watershed

### **Puzzles & Events**

- 38 Chesapeake Challenge These puzzles cover a lot of ground
- 38 Bay Buddies · Grounded!
- **34 Bulletin Board •** Volunteer Opportunities Workshops Events • Programs • Resources

#### Forum

#### Commentary • Letters • Perspectives

- **30** Chesapeake Born Lure of mainland tugs at roots and hearts of Smith Islanders
- 33 How can we save oysters if we harvest them faster than they reproduce?

#### Clockwise from left:

Soybeans, sorghum and ... sand? Saltwater intrusion is turning some Eastern Shore farms into barren fields. Researchers are working to help farmers cope with test plots like this. See article on page 14. (Photo submitted by Jarrod Miller)

Osprey chicks cry for food from their nest. In the 1970s, the pesticide DDT devastated osprey populations worldwide, in part by causing the thinning of eggshells that cracked before chicks could hatch. A ban on DDT has once again returned this bird of prey to Bay skies. See article on page 12. (Dave Harp)

Seven Foot Knoll Lighthouse in Baltimore's Inner Harbor is the oldest of the four remaining screwpile lights in Maryland. See article on page 22. (Dave Harp)



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### Your local Project Stream Cleanup needs you this spring!

**By LUCY HELLER** 

As I reach the halfway point for my Chesapeake Conservation Corps year with the Alliance for the Chesapeake Bay, I find myself reflecting on what it is that has made my past six months so special.

A large number of the great memories comes from the amazing people I work with, as well as the gratifying, hands-on work that I get to be a part of, including attending Project Clean Stream events around the watershed.

The project is at the core of the Alliance's mission because it engages the public in helping to restore and protect the Bay watershed's land and waterways through local volunteer cleanups.

The last Project Clean Stream cleanup I participated in took place at Baltimore's Hanlon Park Community. Victor Ukpolo Jr., a concerned community member, organized and registered the event and served as the site captain. The 30-degree temperature that Saturday had failed to stop volunteers from showing up and powering through the cold to collect bags and bags of trash. Hands-on experiences like this enable volunteers to see the damage caused by trash and the benefits of picking it up.

Project Clean Stream not only improves the beauty of surrounding areas and health of waterways, it also encourages neighborhoods, towns and cities in the Chesapeake watershed to work toward fostering environmental stewardship in the community. The Alliance's goal is to provide technical support to local groups to help them coordinate their own trash cleanup, rally volunteers and properly dispose of the trash. People attending these cleanups are inspired to reduce the amount of trash they create and are encouraged to continue to care for their local waterway.

"Why do people have to use



tify the trashcovered areas, register them on our website, then work to spread the word about the event and rally volunteers. These regis-

tered sites cover a wide variety of public land including parks, schools, houses of worship and even neighborhoods. Captains are essential for fostering a relationship between cleanup events and one of the most

Hanlon Park Community members gather after their trash cleanup. (Alliance for the Chesapeake Bay)



plastic?" asked Charlotte, a 10-yearold volunteer at Hanlon Park as she placed a plastic water bottle that had been buried in the dirt into her trash bag. I told her that there isn't a good reason for people using plastic, but I thanked her for her help and told her she should tell all of her friends about how she spent her Saturday cleaning up her local stream. When Charlotte left that day, she ran up to me to tell me she would be sure to share with all of her friends how she cleaned up her local stream, and how water bottles and other trash can end up littering our streams and the Bay.

While Project Clean Stream takes place year-round, spring is just around the corner, which that means that we are beginning to prepare for a busy season of Earth Day events, stream cleanups, tree plantings and more. Beautiful weather and blooming

flowers make spring a popular season for people to get outside and participate in community service that works toward creating a healthier planet. This includes thousands of volunteers participating in watershedwide Project Clean Stream events.

To celebrate spring and kick off a year full of stream cleanups, the Alliance is presenting All Hands on Deck Day on Saturday, April 6, and will be hosting an open house at our headquarters in Annapolis. The open house is a chance to meet Alliance staff and learn about our work in Maryland as well as across the watershed. We will also be giving away native plants to educate the public about how and why these species contribute to a healthier Chesapeake watershed.

The Alliance encourages community engagement and environmental stewardship, and April 6 is just the start. Project Clean Stream could not be what it is today without team leaders like Ukpolo, who volunteer as site captains for local cleanup sites. Site captains are the volunteers who iden-

important aspect of Project Clean Stream — working with community members to help them recognize the negative impact of litter and why it is important to prevent trash from reaching local waterways, which Charlotte realized after filling an entire bag with trash she collected all by herself.

It is simple and easy to register a site that you thinks needs some attention. We recognize that not everyone has the time to take the lead on a cleanup event. This spring, we encourage local stewards to visit our Project Clean Stream website, and to search the existing cleanups for one near them. Be sure to check back periodically as more events are registered each week.

If you would like to learn more about Project Clean Stream and how to get involved as a volunteer, site captain or coordinator organization, visit allianceforthebay.org/projectcleanstream.

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



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### Academy prepares citizens to lead the way in Bay cleanup

Master Watershed Stewards' projects range from training others and installing rain barrels to complex stream restorations.
 By JEREMY COX

Maya Alexander wants to help a school in Maryland's Anne Arundel County gain its "green" certification. She is committed to volunteering for months, training students how to save energy, recycle classroom waste and collect rainwater to water plants.

A 24-year-old with a bachelor's degree in psychology, Alexander said she hopes to dedicate her career — whatever that turns out to be — to changing the way people think about the environment, as well as the way they treat the Chesapeake Bay in their own backyards.

The addition of another green school to the list of more than 600 statewide is unlikely to tip the scales significantly for the Bay's restoration. Now in its fourth decade, that cleanup hinges on the governments of six states and Washington, DC, working in concert to contain the flow of pollution across thousands of square miles.

But what if there was a way to train hundreds of volunteers to undertake community-scale restoration projects and spread conservation practices to homeowners and businesses?



Jim Crafton and Maya Alexander pore over a budgeting exercise during a recent Anne Arundel Watershed Stewards Academy workshop at the Arlington Echo Education Center in Millersville, MD. (Jeremy Cox)

The Anne Arundel Watershed Stewards Academy was founded on just such a principle. Now in its 10th year, the nonprofit has trained more than 220 residents, conferring upon each the title of "Master Watershed Steward."

Surveys show that residents often

feel disconnected from the Bay and its restoration. But Anne Arundel officials say the academy has demonstrated a way to bridge that divide.

"It would be impossible for county government to improve the health of local waterways and the Chesapeake without the support and assistance of our local citizenry, and WSA helps build that support," said Erik Michelsen, administrator of the Anne Arundel watershed protection and restoration program.

In January, the academy named Michelsen the recipient of its inaugural "environmental legacy" award. Watershed stewards are

Watershed stewards are not simply weekend warriors. The academy estimates that its participants have installed more than 2,500 projects, ranging from rain barrels to complex stream restorations. Meanwhile, the trainees have become the trainers, educating 135,000 local residents on how they can take action to protect the Bay.

Today, just about every environmental nonprofit in the county has at least one or two watershed stewards

among its ranks. To maintain their certification, stewards perform 40 hours of community service and attend eight hours of continuing education courses annually. The academy doesn't

**ACADEMY** CONTINUES ON PAGE 6



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### 5

### BAY JOURNAL • MARCH 2019

### ACADEMY FROM PAGE 5

track all of its students, but half of the original class of 32 has met that criteria, according to the nonprofit.

All participants leave a mark in the community before they graduate. After attending 70 hours of classes taught by academy staff and subject experts, stewards-in-training are required to complete a final project, creating either an environmental literacy initiative or a shovel-in-the-ground restoration project.

"We want everything the stewards learn in class to be about how to take action," said Suzanne Etgen, cofounder and executive director.

Lately, the nonprofit has been receiving nearly twice as many applicants as it can accept. The program, which typically takes a little more than a year to complete, attracts a range of students, from local environmental advocates to retirees, Etgen said.

By day, Alexander works as an educator at the Arlington Echo Outdoor Education Center, a 24-acre youth camp run by the Anne Arundel school system. It makes for a short commute to her weekly Watershed Stewards Academy classes; they take place at night on Arlington Echo's leafy campus.

"It's perfect tying in my background in psychology," said Alexander, who enrolled last fall. "It's all about behavior change."

The classes are open only to people who live, work or worship in Anne Arundel. But the academy has generated ripple effects that can be felt well beyond the county's boundaries.

The concept of training and certifying watershed stewards was in its infancy when the organization was founded in 2009. The inspiration came from Master Gardener programs, which help participants flower into expert horticulturalists.

Etgen, then an educator herself at Arlington Echo, collaborated on starting the nonprofit with her then-boss, Arlington Echo administrator Stephen Barry, and two of the county's top public works officials, Ron Bowen and Ginger Ellis.

"For citizens, there wasn't a lot they could really do" at the time to advance the goals of the Bay cleanup, said Barry, who retired a few years after the academy's launch. "Although there were many, many environmental groups out there, there was nobody doing anything like this with a training program and engaging citizens in a way that WSA did."

Soon, other organizations began to follow their lead.

Their model was quickly adopted by Maryland Sea Grant Extension, which rolled out five academies of its own across the state. To date, more than 300



Master Watershed Stewards Sandie Kirkland, left, and Betsy Love, with Watershed Steward Academy Director Suzanne Etgen, participate in a tree planting and invasive plant removal day at St. Luke's Church in Annapolis. In the background, Maryland Conservation Corps workers remove invasive ivy from the site. (Dave Harp)

students have graduated from those programs.

"We built our curriculum around the Anne Arundel model, making sure our information is consistent with what Anne Arundel presents," said Jennifer Dindinger, a Sea Grant watershed restoration specialist.

She credits the education effort with getting buy-in for some of the Bay cleanup program's strategies in urban and suburban areas.

"It's really helped elevate stormwater management to a topic people are talking about and dealing with on their own properties," Dindinger said. "We're not going to solve all the Bay's problems on public land. We're going to have to work on private land."

For its part, Penn State's Master Watershed Steward program has produced 300 stewards since its inception about six years ago. "We found that these folks, they've always had an interest in the environment, but they never really knew how to plug in," said Erin Frederick, the program's statewide coordinator.

Most of those stewards are based in the Delaware River watershed. But the program recently received a \$111,000 grant from the state Department of Environmental Protection to expand into two Chesapeake watershed counties: Cumberland and Lancaster.

The growing army of watershed stewards caught the attention of officials in Washington, DC and in state capitals across the mid-Atlantic. The most recent Bay Agreement, signed in 2014, added a "citizen stewardship outcome" and an expert panel to track and guide efforts to get regular citizens involved in the restoration. Etgen was chosen to co-chair the committee.

Initial assessments suggest they have a lot of work to do. In 2017, the first year that a comprehensive survey was performed for the Citizen Stewardship Index, the Chesapeake region scored a 24 out of 100.

Disconcertingly, when people were asked whether their actions mattered toward the Bay's overall health, the most popular response was "strongly disagree," with 35 percent of people saying so. Furthermore, while one-third of residents said they volunteered their time or donated money to charitable causes, less than 20 percent did so for an environmental organization.

Etgen said she hopes to not only boost the ranks of the region's stewards but also their diversity. During the Watershed Stewards Academy's annual conference last year, a demographic survey painted a portrait of an organization largely consisting of college-educated white women in their 40s and 50s, she said.

That diversity mission is shared by some of her students.

There were several Anne Arundel schools she could have chosen for her project, but Alexander said she picked Van Bokkelen Elementary, in part, because of its high percentage of students who, like her, are African-American.

"I know what it's like," Alexander said. "The population there, they don't really have a lot of exposure to the outdoors and what it means to recycle."

During an academy class one

January evening, 19 students listened with rapt attention and pens twitching over three-ring binders. The PowerPoint lecture was about budgeting. But no one looked deterred.

Etgen spoke for about 45 minutes, sprinkling her talk with doses of encouragement ("Writing a grant is really nothing more than following directions") and inconvenient truths ("The reality is there's not enough grant dollars to go around for all our projects").

Then, it was the class' turn. The students broke off into pairs and sketched out the details for a hypothetical tree-planting project. Each line on their spreadsheets represented multiple decisions – where the funding would come from, who would do the work, what supplies would be needed.

Steve Hamilton, a medical ewnt retired state energy official, vahunched over their sheet for several minutes. When they had finished moving numbers around, a look of disbelief flashed across their faces. The expenses line

added up to \$6,511 while the revenue had come to only \$6,122. "That's a \$400 difference," said

Cronin, exasperated. Not to worry, said Trish Hennessy-

Webb, a WSA budgeting expert. "What you have before you is a budget. It's a plan for what you're going to do," she said. The final tally at the end of the project doesn't have to match the budget dollar for dollar.

Math is only the beginning. The academy leads students through a whirlwind of disciplines. Graduates are expected to be able to identify pollutant sources, educate communities about the actions they can take to become greener and become their own project managers.

"There's one word for it I like to use, and it's 'empowering,' " said Betsy Love, who graduated in the academy's sixth class. She went on to initiate the \$1.5 million restoration of a stream on the property of the Episcopal church where she worships. "The education is significant, but what you get from this network of like-minded people is empowering. I could never have done it without this course."

As the budgeting class wound down, Hamilton and Cronin remained at their desk, brows furrowed at the spreadsheet before them. Gathering her things a couple of rows away, Alexander was looking instead toward the future.

"I'm already grateful to be a part of this," she said. "I think there's no better way to learn than by actually doing it."

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### Seismic surveying proposal in Atlantic raises Bay concerns

Groups say 250-decibel blasts – 10 seconds apart for months at a time – would have a detrimental effect on whales, other marine life.

### By JEREMY COX

The Atlantic Ocean is staring down the barrel of an air gun, and its blast could reverberate into the Chesapeake Bay.

Despite outcry from coastal communities and most East Coast states, the Trump administration is moving forward with allowing five companies to perform seismic surveys offshore from Delaware Bay to central Florida.

Environmental groups and many marine scientists fear that the tests' loud, repeated blasts, which are used to detect oil and gas deposits deep beneath the ocean floor, could upend an underwater ecosystem that relies on sound for communication.

"The ocean is an acoustic world," said Michael Jasny, director of the Natural Resources Defense Council's marine mammal protection program. "Whales, fish and many other species depend on sound to survive. The extensive blasting that the Trump administration has authorized would undermine marine life on an enormous scale."

The NRDC joined several environmental groups in a federal lawsuit filed in South Carolina in December, challenging the administration's approval of the seismic surveys a month earlier. On Feb. 20, the conservation groups asked the judge in the case to block the seismic tests from going forward while the litigation is pending. The National Marine Fisheries Service decision allows the companies to "incidentally harass" marine mammals during the tests.

Although the surveys would take place along the outer continental shelf in the Atlantic, life in the Chesapeake wouldn't be immune to the effects, experts say. Many species spend time in both the ocean and the Bay, including blue crabs, rockfish, whales and dolphins.

"The Bay is not isolated," said Helen Bailey, a dolphin researcher with the University of Maryland Center for Environmental Science. "It connects to the Atlantic Ocean."

The controversy highlights a stark divide between longstanding federal policy and many in the scientific community over the impacts of seismic technology.

Here's how the tests work: A ship crisscrosses the ocean in a grid pattern, often trailing 18-48 seismic air guns. The guns release compressed air, triggering pulses of sound that penetrate deep into the ocean floor and



Surveying vessels tow air guns in their wake, generating blasts whose waves burrow deep beneath the ocean floor and bounce back to the surface. Recording equipment uses those waves to create 3-D maps of potential oil and gas deposits.

echo back to the ship's sensors, creating a 3-D map of what lies below.

The underwater booms are loud up to about 250 decibels — and are the equivalent on land of a rocket launch. And the noise isn't fleeting. The blasts can go off every 10 seconds and continue for months at a time, with only short breaks for maintenance and weather disruptions.

Scientists say that cacophony could disrupt the behavior of whales and dolphins, which depend on specialized sounds and echolocation for hunting, migrating and communicating. The endangered right whale, whose population has sunk to about 500 individuals, could be especially at risk.

For animals near a blast, consequences could range from them simply fleeing the area to suffering permanent hearing damage, Bailey said.

"An explosion is really a great way to describe it," she said. "If you're at home and there are explosions outside, even if it's not loud enough to damage your hearing, it can be loud enough to annoy you."

Nine state attorneys general quickly moved to throw their legal weight behind the environmental groups' lawsuit aimed at stopping the surveys before they start. The intervening states include four in the Bay watershed: Delaware, Maryland, New York and Virginia.

The suit argues that the National Marine Fisheries Service violated several laws, including the Endangered Species Act, when it issued the permits.

Maryland Attorney General Brian Frosh said he decided to intervene because the tests could lead to drilling off the state's coast, which he sees as a potential disaster-in-waiting for its \$116 million seafood industry and \$2.6 billion ocean-based tourism industry.

"Most of the water in the Bay comes from the ocean. It doesn't flush quickly. Even the normal kinds of spillage that is attendant to offshore drilling could have serious adverse consequences for the Bay," he said.

The groups siding with the NRDC include the Southern Environmental Law Center, Center for Biological Diversity, Coastal Conservation League, Sierra Club, Surfrider Foundation, Earthjustice and Oceana.

The biological opinion issued by the National Marine Fisheries Service estimates that the seismic surveys will not cause any deaths among whales. But the activity is expected to lead to the "harassment" of nearly 10,000 whales, including 19 right whales, and the "harm" of a dozen fin whales, according to the service.

But none of that harassment or harm, according to the agency, is predicted to rise to the level of jeopardizing the continued existence or recovery of any species. That's a key distinction because a "jeopardy opinion" can lead regulators to quash a permit.

The Trump administration's decision echoes years of federal policy toward seismic surveying. In 2014, the Bureau of Ocean Energy Management, which regulates the industry, published a carefully worded "science note" suggesting there has been "no documented scientific evidence" of sounds from air guns "adversely affecting marine animal populations."

Although no seismic blasts have been permitted in the Atlantic for oil and gas exploration since the 1980s, it has been commonplace in the Gulf of Mexico and elsewhere for decades.

"If you look at the Gulf of Mexico, it is teeming with marine life," said Gail Adams, a spokeswoman for the International Association of Geophysical Contractors, the trade association for the companies that perform seismic surveys. "We have some of the best seafood in the world, particularly off the coast of Louisiana. There's just no evidence that sounds from our operations are harming or injuring marine life."

Some scientists say that the lack of evidence for widespread, adverse impacts doesn't mean they don't exist.

"Just because there hasn't been enough support for research to understand the effects doesn't mean there are no effects," said Alexander Costidis, a stranding response coordinator for the Virginia Aquarium and Marine Science Center. "I would argue there's a decent amount of evidence to the contrary."

Tracking the behavior of fish and marine mammals, though, is difficult because they ply depths not easily accessed by humans, he added. If a pod of dolphins ended up becoming stranded on a beach near a seismic surveying operation, for example, it would be nearly impossible to say with certainty that the two events were connected.

The survey proposal faces a growing chorus of political opposition. More than 200 cities and counties so far have taken formal actions to register their disapproval of oil and gas exploration along the East Coast, according to a database compiled by Oceana.

Under that pressure in late 2016, the Obama administration denied requests to restart Atlantic surveying and went a step further, indefinitely banning oil and gas exploration in certain offshore areas. The Trump administration's goahead to the five companies late last year effectively reverses that policy.

"It's like the zombie issue," said Jay Ford, the Chesapeake Bay Foundation's outreach coordinator in Virginia. "How many times can we tell you we don't want you drilling off our coast and you keep coming back?"

### Year of extreme rain takes its toll on oysters in MD waters

✗ Influx of freshwater to the Bay killed off oysters in places, but helped survivors fend off disease.

### By Timothy B. Wheeler

Last year's unrelenting rains apparently killed off significant numbers of Maryland oysters in parts of the Chesapeake Bay watershed and generally impaired their reproduction — but the deluge did help survivors fend off disease.

The 2018 fall oyster survey by the Maryland Department of Natural Resources showed that both adult and juvenile oysters were impacted by the heavier-than-normal rains.

Preliminary results from last fall's annual oyster survey by the state Department of Natural Resources found high freshwater-related mortalities in the upper Potomac River and to a lesser extent in the Upper Bay. The survey also found that the number of new oysters produced last year fell below the long-term average.

DNR officials briefed the department's Oyster Advisory Commission Feb. 11 on the survey, which regularly canvasses more than 250 oyster bars around the Bay and in its waterways. A crew tows a dredge across each bar and tallies the number of live and dead oysters recovered, measures the survivors and checks for tiny "spat" (baby oysters). The survey also sends a random selection of bivalves to the state-federal laboratory in Oxford, MD, to be examined for diseases.

Chris Judy, chief of the DNR's shellfish division, said the die-offs and poor reproduction are a result of heavy rains turning the Bay's semi-salty water much fresher than normal. Oysters tend not to reproduce well in freshwater, and it can even kill them in extreme cases.

Last year's weather was extremely wet. Heavier than normal rains from May through November produced the highest river and stream flows recorded in 34 years, Judy said, pushing unusual amounts of freshwater into the Bay. With streamflow still elevated, Judy said die-offs may continue, and he noted that watermen have reported finding more dead oysters after the survey ended around Thanksgiving.

The survey crew found no spat at all in most of the Bay and several of its tributaries, Judy said. But there were some bright spots, with relatively high numbers of juvenile oysters found on reefs in the Manokin River and Tangier Sound on the lower Eastern Shore. The crew also saw decent numbers of spat in upper Broad Creek near the mouth of the Choptank River, traditionally a good spot



for oyster reproduction.

The reduced salinity of Bay water apparently suppressed at least one of the two diseases blamed for ravaging the Bay's oyster population since the late 1980s. The 2018 survey found the percentage of oysters with Dermo at its second lowest level in the last 29 years, and its intensity tied for the lowest level recorded since those tallies began around 1990.

Back in 2002, Judy said, the DNR survey crew found almost 60 percent of the oysters had died of Dermo or the other disease, MSX. The 2018 survey tallied only a 14 percent Dermo-related mortality rate — well below the long-term average.

"If there's any good news from the rain, disease declined," Judy said. The lab is still checking the MSX data, Judy said, but that is expected to be low as well.

In addition to the good news about suppressed disease, the survey found that the "biomass" of oysters — a combination of their number and size — had rebounded a bit last year after a four-year decline.

The uptick in biomass also could be related to the freshwater influx, Judy said. Spat counts tallied in 2015 and 2016 were slightly above average, and those oysters normally would have reached market size by last year. The 2018 freshwater surge likely impeded their growth, Judy said.

That could give a little help to the commercial harvest, which after reaching a recent peak of 400,000 bushels in 2014 has declined each year since. Last season's harvest was about 180,000 bushels, the DNR said.





### Exelon, MD spar over who is responsible for nutrients passing over dam

State, in relicensing certification, seeks millions to address problems related to Conowingo.

### By KARL BLANKENSHIP

A Maryland official called the pending relicensing of Conowingo Dam a "once in a generation" chance to hold its owners accountable for the environmental impacts the 94-foothigh structure has on the Susquehanna River and Chesapeake Bay.

But a representative of Exelon, the utility that owns the hydroelectric facility, said it had already pledged more than \$300 million to mitigate the dam's impacts over the coming decades and the state was trying to force it to pay billions more to fix problems it didn't cause.

Most of the recent debate between the two parties has taken place in court since Exelon sued Maryland last May over conditions the state sought to place on the company's request for a new 46-year operating license. But representatives from each side also sought to make their case in public at a January meeting of the Chesapeake Bay Commission, a body of state lawmakers and other officials that advise general assemblies in the Bay region.

The 91-year-old hydroelectric dam is located in Maryland about 5 miles south of the Pennsylvania border and 10 miles upstream from where the Susquehanna flows into the Bay.

The dam looms as a major obstacle for Bay cleanup efforts, largely because the 14-mile reservoir it creates has reached its capacity to trap sediment from upstream sources that flows down the river. As a result, the nutrients associated with that sediment now flow into the Chesapeake, where they can spur algae blooms and contribute to other water quality woes.

The state-federal Bay Program partnership has estimated that additional annual reductions of 6 million pounds of nitrogen and 260,000 pounds of phosphorus are needed to offset the impact of the dam's lost trapping capacity. That would be roughly an additional 5 percent reduction for a river where upstream nutrient control efforts in Pennsylvania are already far behind schedule.

The U.S. Environmental Protection agency in February began requesting applications from entities interested in developing a plan to tackle the problem.

Exelon is seeking a new operating license from the Federal Energy Regulatory Commission to continue generating power from Conowingo, one of five hydroelectric facilities



The 91-year-old hydroelectric dam is located in Maryland about 5 miles south of the Pennsylvania border and 10 miles upstream from where the Susquehanna River flows into the Bay. (Dave Harp)

along the lower Susquehanna. But as part of the licensing process, Maryland has to issue a certification that the operation of the dam will maintain water quality standards.

Maryland issued that certification April 27, but imposed numerous

conditions that it said were needed to mitigate water-quality impacts from the dam. Along with a requirement that Exelon fund pollution control practices to offset increased nutrient

levels which could cost the company up

to \$172 million a year — it called for new efforts that would keep debris from flowing downstream, manage river flows to protect nearby habitats, and make fish passage improvements beyond what the utility had already agreed to.

Exelon responded a month later by filing suit in state and federal courts charging that the state was placing an "unfair burden" on the utility by imposing a financial requirement that it contended was "orders of magnitude" more than the dam was worth.

Its suit in state court was later dismissed, but the federal litigation is still pending.

"This is a once-in-a-generation

opportunity," said MDE's senior policy

adviser Mike Perdone, noting that Exelon

is seeking a 46-year license. "That means

the next time that it comes up for renewal,

everybody in this room will be retired

or dead. So what we do today,

or don't do today, is going to have

some very long-term consequences."

In his presentation to the commission, Mike Perdone, a senior policy adviser with the Maryland Department of the Environment, said the state was simply fulfilling its responsibility under the law when it issued a certi-

> fication requiring that Exelon take actions to ensure its operations would protect water quality in the area. Perdone

Perdone said the dam caused a host of impacts that have "funda-

mentally altered" both the river and the Bay. He argued that, in addition to impacting Bay water quality from nutrient and sediment pollution, it has blocked migratory fish such as shad, herring and eels; altered river flow in a way that harms downstream habitats; and promoted growth of algae blooms that could impact drinking water supplies.

The state's water quality certification, Perdone said, fulfills its obligation to outline the actions required to offset those impacts and ensure that water quality standards would be met.

"This is a once-in-a-generation

opportunity," Perdone said, noting that Exelon is seeking a 46-year license. "That means the next time that it comes up for renewal, everybody in this room will be retired or dead. So what we do today, or don't do today, is going to have some very long-term consequences."

He disputed the utility's stance that it could not afford to fix the problems. The dam had operated for 90 years generating profits for its various owners during that time, but Perdone contended they had only reinvested a "small portion" of that money to mitigate environmental impacts.

"Is the water quality certification going to bankrupt Conowingo?" he asked. "I don't think so."

Perdone also questioned Exelon's contention that the certification would cost the utility more than the dam is worth, noting that Conowingo is intricately tied to two nearby facilities that it also owns.

Both the Peach Bottom Atomic Power Station and the Muddy Run Pumped Storage Station require water from the dam's reservoir to operate, and both are more profitable than Conowingo, he said. "So," Perdone added, "I would suggest the viability of Conowingo depends not solely on its profitability, but the profitability of all three of these facilitates taken together."

In her presentation, Kathleen Barron, Exelon's senior vice president for government and regulatory affairs and public policy, argued that the state had gone beyond its authority with its

### DAM FROM PAGE 10

requirements for Conowingo, which she said was also the state's largest producer of renewable electricity.

Under the law, she said, a dam owner is responsible for discharges "added by the operator" but not for pollution that originates upstream, as is the case with the nutrients and sediment at Conowingo.

"The law just simply does not require the dam sitting in the middle of the river to be the one that is required to reduce those pollutants, given that it is not the entity that is putting the pollutants into the water," she said.

Similarly, she said, Exelon cannot remove "all visible debris" from the river as it passes through the dam, as the state has requested. While it removes accumulated trash weekly, she said refuse cannot be safely collected during periods of extreme flows, like those that frequently took place last year.

Barron said that, by trapping sediment and nutrients, the dam has benefitted the Bay by preventing pollution from flowing downstream for most of its existence. And, she contended, it still helps in that regard. Although its reservoir is essentially full, it continues to trap some portion of nutrients for a short period of time, allowing them to degrade and making them less harmful when washed downstream.



The 14-mile reservoir behind Conowingo Dam has reached its capacity to trap sediment from upstream sources that flows down the river. As a result, the nutrients associated with that sediment now flow into the Chesapeake. (Dave Harp)

Barron said the utility had already committed more than \$300 million toward future environmental projects during the life of the new license, much of it related to resolving fish passage issues at the dam. But, she said, meeting Maryland's requirements in the water quality certification could cost \$15 billion.

"I can tell you the dam is not worth \$15 billion," she said. "The other facilities up there are not worth \$15 billion."

Both sides indicated they would welcome negotiations to resolve the issues. But by late February, a spokeswoman for Exelon said no talks had taken place.

Meanwhile, the EPA in February requested applications from entities interested in developing a plan to offset the increase in nitrogen and phosphorus pollution making its way past the dam's reservoir.

That entity would be in charge of overseeing the creation of a watershed implementation plan — similar to those being developed by states to meet their Bay nutrient reduction obligations — that would identify needed actions to reduce or offset the increased pollution.

The entity would also develop a strategy for funding the cleanup actions, identify new sources of revenue and potentially develop new public-private partnerships to get the job done.

"This has the opportunity to actually spur some innovation, create some innovative financing, maybe bring more money to solve this challenging problem," said Matt Rowe, assistant director of the MDE's Water and Science Administration and a member of the Bay Program committee working on the Conowingo issue.

The EPA's request does not mention Exelon, but Maryland officials have said they anticipate any settlement with the utility would help fund implementation of the plan.

Meanwhile, in the state General Assembly, a group of lawmakers introduced legislation in February that would require Exelon to pay for at least 25 percent of the cost associated with the Conowingo watershed implementation plan.



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### Ospreys, their fate once up in the air, soar again over Chesapeake

Bird's recovery offers hope for resurrecting other species in peril.

#### **By JEREMY COX**

Ospreys are a familiar sight on the edges of the Chesapeake Bay and in the tidal reaches of its tributaries, as abundant as sailboats on a sunny weekend afternoon in spring.

Drawn by warming weather, the promise of plentiful food and shallow water in which to hunt, they return to the Bay watershed every March. As remarkably adaptable birds of prey, ospreys can be found on every continent except Antarctica, but they have a special affinity for the Chesapeake. Nowhere else on the planet is there a larger breeding population.

Ospreys (*Pandion haliaetus*) may be flying high now, but that wasn't always the case. Four decades ago, the population bottomed out at 1,450 nesting pairs around the Bay. Since then, their numbers have climbed more than eightfold, scientists estimate.

The osprey's comeback story is a ray of hope for other recovery efforts, researchers say, if not an exact model that can be replicated for other species.

"You can go just about anywhere in the Bay and see osprey now," said Bryan Watts, director of the Center for Conservation Biology of the College of William and Mary and the Virginia Commonwealth University. "I think they've become a really good symbol for how well we're doing with the Bay."

The turning point came in the 1970s after the federal government banned DDT, the chemical believed responsible for the osprey's near destruction, said Barnett Rattner, an ecotoxicologist with the U.S. Geological Survey.

"Some of the most toxic chemicals affecting the osprey — the concentration of the chemicals in the food web — has decreased over time," said Rattner, who studies the connection between toxic chemicals and osprey health. "There are still some problem areas from a pollution standpoint, but things seem to be improving."

Standing watch over a channel marker, soaring in lazy parabolas, effortlessly snatching a fish — no matter the activity, ospreys are among the most recognizable bird species in the Bay region. The white breast and throat contrast sharply with the bird's dark-brown back. Its crown is white, like a bald eagle, but with a brown band around the forehead.

Males and females usually mate for years, sometimes for life, but they don't spend all of their time together, research has shown. They winter together in South America, but in the spring males fly northward



An adult and juvenile osprey rest on a nest at the mouth of Raccoon Creek at its confluence with the Choptank River in Maryland. Osprey numbers have been swelling in the wake of artificial platform construction efforts and the banning of certain herbicides. (Dave Harp)

first to scout nest sites. Once a nest is established — preferred spots are near water with good visibility — pairs return to it year after year.

The raptors also are distinguishable by their white feet and black talons, which are highly adapted for snagging fish near the surface of the water in midflight, Watts said. Ospreys tend to catch fish measuring 10–12 inches long. That partiality for larger fish nearly doomed the species, it turns out.

During the 1950s and '60s, the osprey population crashed worldwide, along with other raptor species such as eagles and peregrine falcons. The main culprit, scientists would discover, was DDT — the pesticide that inspired Rachel Carson to author her seminal book, *Silent Spring*, in 1962.

The chemical had a greater effect on species at the top of the food chain, such as ospreys, Watts explained, because of a process known as biomagnification. After farmers sprayed DDT on their crops, some ran off into streams and into the Bay, where microscopic zooplankton ingested the substance. Small fish fed on the zooplankton; progressively larger fish fed on one another. Each step up the ecological ladder, the DDT became more concentrated in the tissues and internal organs.

DDT delivered a one-two punch to ospreys and other raptors, Watts said. Some birds were simply poisoned by large doses of the pesticide. But even nonlethal doses affected the hormone responsible for the calcium content of eggshells. The females began laying eggs that were often too soft to produce young.

Congress banned DDT in 1972. Osprey numbers have been on the rise ever since, Watts said. Today, he estimated, the Chesapeake region is home to around 12,000 nesting pairs in the spring and summer.

"[The Bay] is one of the most productive aquatic ecosystems in the world, driven by the all the shallow water. It's the perfect area for ospreys to thrive," he said. "And they have."

Ospreys are again taking up seasonal homes in places where they haven't been spotted for decades. When their population was waning, the raptors retreated to the mainstem of the Bay, Watts said. But as their numbers have multiplied, they have radiated up into rivers and streams.

Their upstream absence was so protracted that two or three generations of osprey researchers were unaware that such "tidal fresh" areas could support the birds, Watts added.

Their rebound might not have been possible, though, without a large-scale intervention inspired by the raptor's own behavior, researchers say. At first, their habit of nesting on navigational markers was considered a nuisance because the giant piles of sticks would often obscure lights and signs. Wildlife officials soon realized, though, that building artificial platforms could accelerate the osprey's comeback.

The structures are sturdier than trees and can be placed where predators, such as raccoons, can't prey on their eggs. Between comprehensive surveys undertaken by Watts' center in 1973 and 1996, the proportion of nests built by ospreys in trees plummeted from 31 percent to 7 percent as the birds switched their allegiance to channel markers and artificial platforms.

For a dramatic case study of the osprey's renaissance, look no further than Poplar Island on the eastern side of the Bay in Maryland, just offshore Knapps Narrows and Tilghman Island. Poplar Island was well on its way toward disappearing until the Army Corps of Engineers in 1998 began rebuilding it with sediment dredged from the bottom of shipping channels serv-

ing the Port of Baltimore.

Today, amid the ongoing reclamation work, Poplar has become a sanctuary for osprey and other birds. In 2004, U.S. Fish and Wildlife Service biologists began stocking the island with osprey chicks recovered and rehabilitated by Tristate Bird Rescue in Newark, DE. The number of annually viable nests on the island has risen from five to 28 in that span, said Peter McGowan, who heads the program for the agency.

"The ospreys are a great success story," he said. "It shows you how impacted those guys were during the DDT era."

During the USGS's most recent osprey study, which took place 2011–2013, Rattner and his team found lingering traces of DDT and PCBs in fish and young ospreys. But the concentrations were much lower than the levels that caused the 20th-century decline, he said.

Although ospreys appear to be thriving, scientists and wildlife officials need to remain vigilant, Rattner said. He is concerned about the impact of hunting in parts of the birds' Southern Hemisphere territory, as well as signs of reproductive troubles in heavily industrialized areas, such as near Baltimore's Back River wastewater treatment plant.

Overall, though, the study showed that the long-range improvements have continued. "Things seemed to have been improving," he said, "and that was good news."

### Gas pipeline on shakier ground as legal challenges add up

Construction of Atlantic Coast project grinds to a halt after courts reverse 3 federal permits.

### By WHITNEY PIPKIN

A string of recent court decisions has left the future uncertain for a sprawling natural gas pipeline project cutting its way across some Chesapeake Bay states.

Judges have reversed three federal permits that would have allowed the Atlantic Coast Pipeline to cross national parks and trails or to impact endangered species, halting construction while Dominion Energy, the project's backer, regroups to appeal.

Despite strong local opposition along the project's 600-mile path — which winds from West Virginia through Virginia to North Carolina — the Atlantic Coast Pipeline had been gathering steam over the last three years while garnering the federal and state permits necessary to begin construction in Virginia.

Dominion officials contend that the pipeline is essential to meet growing energy demands along the East Coast and to replace coal-fueled power generation with natural gas.

The project is one of several pipelines planned or under construction to carry natural gas across portions of the Chesapeake Bay watershed. The gas is extracted from underground shale formations using a controversial technique called hydraulic fracturing, or "fracking," and pipeline construction often entails disrupting wetlands, crossing streams, removing trees and exposing bare soil, sometimes on steep slopes.

Environmental groups say the \$7 billion Atlantic Coast Pipeline, the largest project of its kind in the region, poses an unnecessary threat to natural resources and cost to ratepayers. They also argue that the hurried permit process that preceded it cannot now stand up in court.

"The big picture here is that the Atlantic Coast Pipeline is in trouble," said Greg Buppert, a lawyer with the Southern Environmental Law Center representing environmental organizations in several of the lawsuits. Now, the company "doesn't have multiple required permits to proceed with this project."

This spring, SELC attorneys and others will go for the project's metaphorical jugular by challenging its baseline permit from the Federal Energy Regulatory Commission, which set it into motion four years ago. They will argue that FERC's singular requirement — that the project must have a signed contract with future natural gas recipients — does not go far enough. That's because, in this case, subsidiaries of Dominion Energy are both building the pipeline and claiming demand for it as future customers. Because FERC



An aerial photo taken by volunteer pilots shows construction of the Atlantic Coast Pipeline in West Virginia in 2018. Construction on the pipeline has been halted as judges have revoked or questioned key federal permits for the project. (Pipeline Compliance Surveillance Initiative / pipelineupdate.org/csi)

permits the company to earn up to a nearly 15-percent return on investment for building the pipeline project, advocates say the company makes a profit from the process regardless of whether the infrastructure is actually needed.

Will Cleveland, another SELC attorney, said that Dominion has justified the need to supply East Coast customers by "wildly overpredicting demand." He contends that the Virginia State Corporation Commission bolstered that argument in a Jan. 17 decision, when it rejected Dominion's plans to modernize its energy grid, stating that they were based on inflated load projections for the future.

Energy efficiency improvements and restrictions on carbon emissions are continuing to reduce — not increase the need for new sources of natural gas in some of the areas that would be served by new pipelines, Cleveland said.

Some financial analysts have begun to cast doubt on energy companies' abilities to complete two major pipeline projects on the East Coast amid setbacks.

The investment management company Sanford C. Bernstein & Co. LLC told its clients in late January that increasing costs of both the Atlantic Coast and Mountain Valley pipelines could force the operators to charge too high of tariffs to make them competitive.

One report from Bernstein analysts suggested "that possibly only one of these projects will ultimately get done" as they both face delays and setbacks.

But Dominion spokesman Karl Neddenien said the Atlantic Coast Pipeline will deliver natural gas that is "essential" to North Carolina and parts of Virginia where additional power generation would boost economic growth. Groups opposed to the project, he said, are only delaying it — and driving up the cost — "because, ultimately, they know the Atlantic Coast Pipeline is urgently needed."

Meanwhile, construction at the 300mile Mountain Valley pipeline, which began across mountainous terrain in Virginia's southeast corner this year, also has faced legal setbacks. Its construction was riddled with environmental violations during a particularly rainy spring and summer last year.

Virginia Attorney General Mark Herring and the state Department of Environmental Quality filed a suit on Dec. 7 against the project over more than 300 environmental violations between June and mid-November, mostly related to improper erosion control and stormwater management. Later that month, the State Water Control Board, which had issued the pipeline project's permit at the end of 2017, voted to reconsider its certification through a process that will unfold this year.

Both of the pipelines have faced setbacks at the federal level as the U.S. Court of Appeals for the Fourth Circuit has rejected key permits. In May and August, the court tossed out permits that had been granted by the U.S. Fish and Wildlife Service and the National Park Service. On Dec. 13, the court rejected a third federal permit for the Atlantic Coast Pipeline from the U.S. Forest Service that would have allowed it to cross the Appalachian Trail.

Dominion's Neddenien said the company is appealing the decision to revoke its Forest Service permit. He said the pipeline would be constructed 600–800 feet below the surface of the Appalachian Trail using the horizontal directional drilling that has been used to pass beneath streams and water bodies in other areas.

"There are currently 56 other pipelines operating safely under the Appalachian Trail," Neddenien said. "There's no reason we should not be number 57."

With so many federal permits currently rejected by the courts, the Atlantic Coast Pipeline had to stop all construction activity, which had begun in West Virginia. The pipeline had not yet broken ground in Virginia, though some tree-clearing began last year.

Neddenien said that the project was estimated to cost up to \$5 billion when it was originally proposed in 2014 but will now cost as much as \$7 billion. The pipeline was planned to be in service by late 2018 and is now planned to come online in two phases starting in late 2019. "And that is, of course, contingent on the court ruling we are waiting to hear from now," he said of the company's planned appeal of the Forest Service permit decision.

Lawyers aren't the only ones continuing to oppose pipeline projects in Virginia, where environmental organizations are training citizens to keep an eye on construction and violations with the help of water quality monitoring and photographic fly-overs. Ben Cunningham, a Virginia field coordinator for the Pipeline Compliance Surveillance Initiative, said the goal of these efforts is to stop construction of the pipeline and bolster environmental oversight.

"Whatever does happen, Dominion is not in a good place right now," he said. "I like to say that we have them on the ropes somewhat."



### Saltwater intrusion laying waste to Delmarva farms as sea level rises

 ➢ Researchers mapping rate of incursion and testing which crops perform best under these changing conditions.
 By JEREMY COX

Bob Fitzgerald and his ancestors have farmed the same land on Maryland's Eastern Shore off and on since 1666. He will be the last.

Dubbed "Waller's Adventure," the 160-acre farm has begun sinking at an alarming rate. What started as a "little wet spot" has swollen in just the last few years into a bowl-shaped, 2-acre void, Fitzgerald said.

"You can see where it's dead soil," he said, pointing to a bare swath of sand in the middle of the depression. "This is how you lose it," the 79-year-old added with rising concern in his voice. "This is how it starts."

The problem is a common countertop substance that doubles as an ancient scourge to farmers: salt. Saltwater, pushed onto the surface and into the groundwater of some Eastern Shore farmland by rising the sea level, is making crop production increasingly difficult. And saltwater intrusion has already started to force some Shore farmers off their land, according to emerging research led by the University of Maryland.

"It's happening now," said agroecologist Kate Tully, the team's leader. "We often talk about sea level rise and climate change as this thing that's going to happen in the future. And it's already happening. We're at the point we're already losing farm fields."

In rural Somerset County, home to Fitzgerald's corn and soybean operation, the researchers used land-cover-sensing software to determine that farmland has been converting to salt marsh at a rate of about 100 acres per year since 2009. That adds up to 860 acres lost, the equivalent of four average-size farms.

"Now we have to think about how much we're going to lose in the next five years," Tully said, and how to manage the farms where salt is beginning to intrude.

No one has mapped how much land across the low-lying Eastern Shore has been affected by saltwater intrusion. Creating such a map is part of Tully's five-year, \$1.3 million research project. The effort is now in its second year.

The researchers' work, funded largely by the U.S. Department of Agriculture, is primarily aimed at providing answers for the farming sector — the Shore's biggest industry. But it also could carry implications for the multi-state and federal restoration of the Chesapeake Bay, Tully said.

That's because salt, by a quirk of chemistry, has a knack for dislodging nutrients in farm soil. Instead of remaining chemically bound to the soil, nitrogen



"This is how it starts." Bob Fitzgerald looks over what started as a "little wet spot" that has swollen in just the last few years into a bowl-shaped, 2-acre void. (Dave Harp)

and phosphorus break free. From there, rainfall can whisk those nutrients into one waterway, then another and eventually into the Bay, where they fuel algae blooms and trigger a cascade of harmful ecological events.

And there are lots of nutrients in Eastern Shore soil. Portions of the Shore's farmland are saturated with nutrients, particularly with phosphorus, from decades of fertilization at levels that exceed the plants' ability to use it.

According to the first scientific paper to be published from the team's research, "these agricultural legacies will likely be unlocked as saltwater intrudes on farmlands and have devastating consequences for downstream ecosystems."

The Chesapeake Bay Program computer model estimates that guide the Bay cleanup may need to be revised to account for saltwater impacts in some locations, said Keryn Gedan, a coastal ecologist at George Washington University who launched the study with Tully.

"We haven't gotten to a point where those numbers can be put into the Bay model, but we think they [the model's architects] will be interested," she said.

The pair said they decided to conduct their study in the Bay region because it is one of the world's hot spots for sea level rise. Water levels off Maryland's shores are rising faster than the global average. Scientists attribute the accelerated regional trend to two factors working in concert: a weakening Gulf Stream coupled with land levels sinking in the wake of their bulging during the last Ice Age. As a result, experts predict that Maryland's "relative" sea level rise will reach 3.7 feet by 2100; the global average is projected to be 2.7 feet.

On the Eastern Shore, saltwater intrusion has been one of the forerunners of climate change, Tully said. "It kind of moves ahead of sea level rise. When you get to the point you're having chronic flooding on your field, you have this very visible water line. Saltwater intrusion will actually push ahead of that line."

Larry Fykes has been assisting farmers as part of the Somerset Soil Conservation District for 35 years, most of it as the agency's district manager. Salty soil has been a growing headache in coastal areas for years, but it began accelerating after Hurricane Sandy flooded much of the county in 2012, he said.

Exceptionally high tides — which climate scientists refer to as "sunny day flooding" — used to strike once every six months. But since Sandy, they seem to come every month. And he doesn't know why. "Something's going on," Fykes said. "These tides come up [onto a farm], and the next year they come up another 20 feet. And the next year they come up another 20 feet," he said. Once the salt has worked its way into the soil, he added, "it's there forever."

In fact, a variety of forces are conspiring to taint the Shore's farms with salt, Tully said. Storm surges pile tidewater onto the land with increasing regularity. Irrigation pumps can thin underground freshwater reserves, drawing in the surrounding saltwater to take its place. Meanwhile, ditches and canals can introduce salty water from tidal creeks far into agricultural fields.

The soil can become saltier than the ocean itself, Tully said. Once the water evaporates or runs off, it leaves behind dense salt deposits. The ocean's salinity averages about 35 parts per thousand. But in a salt marsh, where the water routinely ebbs and flows, plants need to tolerate salt concentrations that can spike as high as 60 parts per thousand.

Some farms in the lowest-lying parts of the Shore are slowly turning into salt marsh, mainly in coastal Somerset and Dorchester counties, Tully said. But it's spreading. Behind the wheel of

his red Ford F-150 pickup truck, Fitzgerald pointed out one abandoned field after another in the western portion of Somerset. "All this was farmed two years ago," he said, gesturing toward one expanse of yellow, stalky phragmites and salt marsh hay. "He just got tired of fighting it."

The problem is shared throughout the Delmarva Peninsula, the 170-mile-long elbow jutting into the Atlantic Ocean between Philadelphia and Virginia Beach. Many of its farmers aren't giving up easily, installing tide gates on drainage pipes to keep saltwater at bay and switching to more salt-tolerant crops.

A farm typically doesn't falter overnight, Fitzgerald said. Soybeans can withstand salt concentrations up to about 3 parts per thousand; corn, 1 part per thousand. Encroaching salt first reduces a field's yield — the amount of crops it produces. Over time, yields dip too low for it to remain financially viable.

"It becomes what we call marginal land," said Jarrod Miller, a soil expert with the University of Delaware. "It's not the most productive. So how do you keep that in production?"

Most of Somerset County's \$219 million agriculture industry revolves around poultry production: raising chickens or planting corn and soybeans to feed the birds. Nearly 50,000 acres out of the county's total 207,000 acres of land are given over to farming. But, for a variety of reasons, farmers there have

### Cleaner coal ash disposal gets bipartisan support in VA

Dominion must remove ash from impoundments at 4 sites for recycling or to be placed in safely lined landfills.

### By Whitney Pipkin

Virginia is poised to stop the storing of coal ash in unlined pits near Chesapeake Bay rivers after years of debate over the lingering environmental hazard. Lawmakers in February passed a bill requiring the state's largest utility to remove ash, a byproduct of burning coal for power, from four sites in the commonwealth during the next 15 years.

Gov. Ralph Northam is expected to sign the legislation that represents a compromise between lawmakers and Dominion Energy, whose facilities produce and store the coal ash. Northam announced his support for the measure earlier this year.

The bill requires Dominion Energy to fully excavate the coal ash from four impoundments near the Potomac, James and Elizabeth rivers. At least 6.8 million cubic yards of the ash — enough to fill the U.S. Capitol's rotunda more than five times — will need to be recycled into concrete-making materials or placed in safely lined landfills within 15 years, according to the law.

In all, Dominion maintains more than 11 coal ash ponds and six coal ash landfills totaling about 27 million cubic yards of ash. Coal ash can contain toxic chemicals and heavy metals such as arsenic, lead and mercury, which have in some cases leached into the surrounding groundwater. "This goes beyond the minimum required by the EPA. We tend to be more hands off when regulating economic activity with an environmental impact, so to adopt rules that are more protective than the EPA — I'm not sure if Virginia's ever done that before." — Sen. Scott Surovell (D-Fairfax)

Environmental groups and residents vocally opposed Dominion's previous plans to permanently store the ash by covering it in leak-prone, unlined pits, a move they said would harm local waterways and drinking water.

"We have fought for four years for legislation like this," Potomac Riverkeeper Dean Naujoks said in a statement. "The dangers of coal ash leaking into groundwater, drinking wells, our rivers and streams, and ultimately, the Chesapeake Bay have long been documented."

Naujoks credited the shift in the General Assembly to Gov. Northam and Sen. Scott Surovell (D-Fairfax), who presented one of several senate bills that led to the bill that passed. Sen. Amanda Chase (R-Chesterfield) also proposed bills that would prohibit coal ash impoundments in the Chesapeake Bay watershed like the one in her jurisdiction.

Surovell's bill would have required Dominion to use railways rather than trucks to transport the ash, when possible, and to recycle as much of the byproduct as possible. A requirement that the company develop a transportation plan with local authorities made it into the final bill. "This goes beyond the minimum required by the EPA," Surovell said. "We tend to be more hands off when regulating economic activity with an environmental impact, so to adopt rules that are more protective than the EPA — I'm not sure if Virginia's ever done that before."

But, he said after the meetings with Dominion and environmental groups that led to the compromise, it's important for the utility to have flexibility in how it adopts the rules at each site to avoid rate hikes for consumers.

The bill addresses how much of the cost of compliance can be passed along to ratepayers with a "rate adjustment clause" that must be authorized by the State Corporation Commission.

In an about-face from its original position, Dominion supported the legislation requiring it to excavate coal ash from several sites. Spokesman Dan Genest said in a statement that the agreement "accomplishes clean closure, minimizes truck traffic and prudently manages customer costs for the closing of ash ponds at our power stations."

Legislators in North Carolina where a drainage pipe from a coal ash pit released 40,000 tons of the contaminant into the Dan River in 2014 — are already requiring their utilities to excavate and recycle coal ash from sites where it could leak into waterways.

Catastrophes like the one in North Carolina led the U.S. Environmental Protection Agency under the Obama administration to require in 2015 that utilities begin dismantling coal ash impoundments. The rules allowed utilities to close the pits where the ash was stored by draining them of the rainwater that had collected in the pits over decades and covering them with synthetic and natural layers.

In 2018, under the Trump administration, the EPA began rolling back several requirements for coal ash pits, such as raising the allowable level of some contaminants in groundwater.

After Virginia residents balked at the idea of permanently storing coal ash near waterways, the General Assembly imposed a moratorium on new permits for closing the pits. Meanwhile, Dominion was required to produce a report; it showed more of the material would be valuable for recycling into bricks and concrete than originally thought.

Environmental groups that have advocated excavating the unlined storage pits celebrated the passing of the bill as a "landmark" step toward clean water.

"One of Virginia's largest environmental threats will now be addressed in a comprehensive way that gets this toxic waste off our riverbanks once and for all and safeguards public health in the long-term," said Michael Town, executive director of the Virginia League of Conservation Voters.

### **SALTWATER** FROM PAGE 14

given up tilling on at least 4,000 acres of their holdings that have been put into land preservation programs in exchange for tax benefits.

Miller is working with Tully and Gedan on another piece of their study. Last year, the researchers and their interns planted test plots, known as "strip trials," on several farms in Somerset and Dorchester counties where saltwater intrusion has become a problem. Their goal is to determine over five years which crops perform the best and in what seasons they thrive the most.

With its low tolerance to salt, corn was a non-starter for Miller. That left him with barley, soybeans and sorghum, a grass used for fodder. The growing season soon turned into a monsoon, forcing him to replant twice in some areas. "It's the reason you do five-year projects — because one year is never good enough," he said.

For their part, Tully and Gedan chose to lean in to the salty regime, growing plugs of salt marsh hay and switchgrass.



While not exactly staples of the American food system, the salt marsh hay could be used for restoration plantings, and switchgrass could be marketed to biofuel producers, Gedan said.

Tully acknowledged that her study has raised more questions than answers so far. "I'm just getting to the point where I

have real hard numbers that I can bring to the table," she said.

Donald Boesch, a marine scientist

and former president of the University of Maryland Center for Environmental Science, called the researchers' study on nutrients "interesting and potentially important." But it is likely premature for the authors to assert that unlocked phosphorus could have "devastating" effects on the Bay's health because they haven't established the rate of its loss, he said.

For their work to inform the Bay model, her group will have to pinpoint

that rate as well as how much land in the watershed is affected by the phenomenon, said Boesch, who is also member of the *Bay Journal*'s Board of Directors.

Last year, Maryland lawmakers required Gov. Larry Hogan's administration to draft a response to the state's growing saltwater intrusion issues. The deadline: Dec. 15, 2019. Jason Dubow, manager of resource conservation with the state Department of Planning, said the committee's strategies will likely draw heavily from Tully's ongoing research.

Still, "this is one of the issues where the state of the science is at a stage where more research and study are needed," he said. "It seems like more information is going to be a central part of the plan."

For some Eastern Shore farmers, that planning comes too late.

As for Bob Fitzgerald, he has no plans to stop cultivating his family's plot anytime soon. He and his wife have no children, and no direct heirs. So, when he dies, he said, the acreage — whatever's left of it — will be put up for auction and the proceeds donated to charities.

### Chicken-rendering plant expansion draws critics on Eastern Shore

Groups concerned about request to almost quadruple wastewater discharge under an 18-year-old permit.

### By JEREMY COX

Carlton Nabb measures the health of the Transquaking River by the fish he catches in it.

When he was young, he could hook perch, catfish, crappies, bass and more in the waterway, which winds through Dorchester County's farm country on Maryland's Eastern Shore. In recent years, the 73-year-old said, its waters have been furnishing mostly mud shad, snakehead and other species with unappealing names.

"I've lived there all my life, and I've seen a drastic change in the fish habitat and the kind of fish in there," Nabb told a group of residents that had gathered inside a local fire department's meeting room on a chilly November evening.

Several dozen farmers, fishermen and environmental advocates filed into the wood-paneled room to get information about a chicken-rendering plant's plans to nearly quadruple the amount of treated wastewater it releases into the Bay tributary.

If Maryland environmental officials approve Valley Proteins' wastewater permit, the plant's average discharge will swell from 150,000 gallons per day to 575,000 gallons per day, according to documents the company has submitted to the state.

"The business of this chicken waste coming out of the plant, we need more information about what is exactly going on down there," Nabb said at the event, which was hosted by the Dorchester Citizens for Planned Growth and the League of Women Voters of the Mid-Shore of Maryland.

Those organizations and two others are raising questions about the expansion project. In a joint eight-page letter to Ben Grumbles, secretary of the Maryland Department of the Environment, they asked last November how the river could achieve its nutrient-reduction targets if the plant's permit is granted.

The Transquaking was added to the state's impaired waterways list for nutrient pollution in 2000. That same year, the U.S. Environmental Protection Agency approved pollution caps for the river that target nitrogen and phosphorus, the two major nutrients. The caps require combined reductions of 50 percent for nitrogen and nearly 30 percent for phosphorus from all of the sources in the Transquaking's 110-square-mile watershed.

So far, water quality is not improving. A decade of water sampling overseen by the Nanticoke Watershed Alliance at a site just downstream from the Valley Proteins



Bob Sellers pulls a water sample from the Transquaking River. It will be tested for nitrogen and phosphorus, among other things. (Dave Harp)

facility shows nitrogen levels remaining unchanged and phosphorus amounts trending upward, said Roman Jesien, a scientist with the Maryland Coastal Bays Program and board member with the Dorchester Citizens group.

Valley Proteins, based in Winchester, VA, is one of the nation's largest rendering companies. Its Linkwood, MD, facility serves as a catch-all for the Shore's chicken industry. Each week, trucks offload millions of pounds of feathers, blood and guts — what's left after chickens are processed for human food. The plant boils it down into pet food.

Valley Proteins announced plans to expand the 1950s era facility shortly after purchasing it in 2013. It needs to ramp up production to keep pace with the chicken industry's growth in the region, said Robert Vogler, the company's director of environmental affairs. Despite the heavier output of wastewater, upgrades to the facility's wastewater treatment plant are expected to reduce the nitrogen and phosphorus loads by 25 percent, he said.

"We can understand the individuals and groups that have an interest in protecting the Bay and the [Delmarva] Peninsula having concerns about an expansion such as this," Vogler added. But "we strive to be good neighbors and conduct business in a way that's compatible with the community and laws and regulations."

Alan Girard, head of the Eastern Shore office of the Chesapeake Bay Foundation, a group that also signed the letter to the MDE, contends that the public documents submitted by Valley Proteins don't make it clear that nutrient loads will be reduced. He would like to know if the company's plans to divert some of the waste to nearby farmland would simply shift the pollution around.

The new wastewater permit, if approved, would hold Valley Proteins to a different standard than the state's municipal wastewater treatment plants, Jesien said. Under the state and federal Chesapeake Bay restoration effort, Maryland and other states have set a nitrogen concentration limit of 3 milligrams per liter on municipal plants.

Privately run wastewater treatment plants, such as the one at Valley Proteins, can discharge waste containing up to 8 milligrams per liter — and that's what the company plans to do, according to permit documents.

"I think they need to ratchet it down a little," Jesien said.

The Transquaking flows in a southwesterly direction for about 23 miles from East New Market to its mouth at Fishing Bay. It remains a magnet for paddlers and anglers, but it has a troubled environmental track record. In 2002, scientists with the Maryland

Department of Natural Resources detected a stubborn outbreak of *Pfiesteria piscicida* in the Transquaking. Pfiesteria is a microscopic plant-animal hybrid that can cause massive fish kills and a range of possible health problems, including memory lapses and respiratory irritation. Seven years later, the Dorchester County Health Department warned people against having contact with the water in Higgin's Mill Pond, which is part of the Transquaking's headwaters, because of high concentrations of blue-green algae.

The river's nutrient limit, officially known as a total maximum daily load,

was aimed at curbing recurring algae blooms that sapped the water of most of its oxygen.

It's unclear whether the Transquaking has made progress toward meeting its TMDL or slipped further away from the goal. Neither the MDE nor the EPA have conducted a comprehensive assessment of the river since the TMDL was created.

But environmental advocates worry that it's heading in the wrong direction. At the time the TMDLs were established in 2000, the rendering plant was the watershed's sole source of "point" pollution — the kind that can be traced to a specific pipe or drain. Since then, the plant has at least doubled its production output, increasing the amount of wastewater that streams from its outfall.

Although Valley Proteins' plant remains the largest point-source polluter in the watershed, two additional point sources have joined it since the pollution caps were created, the environmental groups said in the letter. They also asked the MDE to consider the impact of the influx of large poultry-raising operations in the area.

"It is very troubling ... that the [Valley Proteins] expansion appears to be going forward without a clear and comprehensive public plan to accommodate the expansion and associated increased discharge in compliance with the Transquaking River TMDL," the groups wrote.

Another point of contention: The plant is still operating from an MDE wastewater discharge permit that expired in 2006. The agency, though, approved a water withdrawal permit last September allowing Valley Proteins to boost its water usage to an average of 150,000 gallons per day, a 30 percent increase.

If the plant is piping in more water, critics suggest that it must be producing more wastewater as well. "We expect that means more wastewater coming out of the plant, yet we're still operating under an 18-year-old permit," Girard said.

MDE spokesman Mark Shaffer downplayed the effect of the additional water usage, saying most of it is destined to evaporate off the plant's industrial broilers. "Loading limits in the current permit, which remains in full force and effect, ensure that any increase in flows will not be allowed to violate the TMDL requirements," he said.

The groups behind the letter to the MDE requested a meeting with agency staff to discuss their concerns. Fred Pomeroy, president of Dorchester Citizens for Planned Growth, described the Jan. 22 meeting afterward as a "good exchange."

Shaffer said in an email that agency officials plan to meet with the groups again in March. The MDE won't issue a draft permit for the discharge until afterward, he added.

### *Tracking life in DC's urban streams has its ups — and downs*

✤ Volunteer monitors' joy in increased presence of eels and minnow and fly species offset by dwindling number of other creatures.

#### BY WHITNEY PIPKIN

Regular visitors to the 1,800-acre national park surrounding Rock Creek in Washington, DC, might be surprised to learn what's living — and what's struggling to live — just below the water's surface.

For starters, American eels have been spotted in Rock Creek tributaries often enough — once in 2010 and three times last year — that the long, slithery sightings are no longer considered a fluke.

Their presence was the highlight of a 28-page report recently released by the Audubon Naturalist Society, whose staff members and volunteers have been counting species in three Rock Creek tributaries for nearly a decade.

"We'd been concerned about whether [eels] could make it up Rock Creek, but [there was] a lot of work done to remove dams and obstacles to fish passage," said Cathy Wiss, coordinator of the ANS water quality monitoring program. She said the snakelike fish lives in freshwater but returns to the ocean to spawn. "They're a good indicator species."

The report also identifies a "surprising diversity of life" in the heavily urbanized streams, which include Melvin Hazen Run, Pinehurst Branch and Normanstone Run.

Like streams in many other cities into which rain washes pollution from nearby parking lots, streets and rooftops — their water quality is considered "poor" or "very degraded." But that doesn't mean they're lifeless.

Since 2011, the ANS and its teams of volunteers have gone out each season to net 20, 1-foot-square samples of what's living in the streams, sorting them into buckets for identification according to the Maryland Biological Stream Survey's protocol, then putting them back in the water.

Going a step beyond that protocol, ANS teams are trained to identify aquatic life down to the taxonomic level of family and, in some cases, they're able to identify them to the genus level. For example, rather than counting the general number of mayflies, they can tally the number of "small minnow mayflies" (*Baetidae* family).

"Most other programs only go to the taxanomic level of order, so we have a much fuller picture of what is living in the streams," said Wiss, who won the Maryland Water Monitoring Council's Carl Weber Award in 2018 for her lead-



*Volunteers for the Audubon Naturalist Society take samples each season of the aquatic life in three Rock Creek tributaries. This monitoring program goes a step further than most to identify organisms down to the taxonomic level of family and, in some cases, to the genus level. (Cathy Wiss)* But the streams still sufference of banks, sediment

ership of community monitoring efforts.

Over the last eight years, ANS volunteers, including students from a local high school, have found 33 taxa of benthic macroinvertebrates. These small backbone-less bugs, worms and crustaceans living on stream bottoms are large enough to see with the naked eye and are important foodstuffs for other aquatic creatures.

The volunteers love spotting something new or unusual. This last year, that included the American eels, one of them large enough that construction workers repairing a gas pipeline next to Normanstone Run noticed it this fall.

The eels (*Anguilla rostrata*) are a host species for the early life stage of Eastern elliptio mussels, without which the mussels cannot reproduce. Mussels are drawing more attention recently for their ability to filter pollution in freshwater streams.

Also in 2018, monitors found for the first time a two-tailed genus of small minnow flies (*Baetidae*) that they believed had not been seen in the District before. Over the last eight years, they noted short-legged striders (*Veliidae*) and backswimmers (*Notonectidae*) in the streams for the first time.

Dobsonflies, a pollution-intolerant insect that the ANS volunteers had spotted in Rock Creek and intermittently in one of the streams, has now been collected in the other two streams as well.

But all too often, volunteers observe species that appear to be dwindling or disappearing.

The ANS report includes a list of 10

aquatic families that had been found in Melvin Hazen Run before 2010 but have not been seen since. Melvin Hazen Run has long boasted the highest diversity of the three monitored streams, but now, according to the report, the stream is "in clear decline."

About 10 years ago, despite the impacts of an oil spill in 1990, there were still good signs from the stream: In 2006, its score exceeded the threshold for adequate diversity. In 2008, students from the Sidwell Friends School monitored the stream and found it to be steadily improving.

But construction projects in the late 1990s transformed a 1.6-acre wooded parcel in the stream's watershed into homes, with more construction to follow, according to the ANS report. Over the last decade, monitors have photographed green algae covering the streambed, and the ANS recommends further study to identify sources of pollution to the still relatively healthy waterway.

"It's a cautionary tale, looking over our historic data," Wiss said. "We found that there were many [aquatic families] that we're not finding any more, that

### Chesapeake Challenge

Answers to These quizzes cover a lot of ground! on page 38. 1. H 2. F 3. E 4. C 5. G 6. A 7. D 8. B 9. Air = 25 percent Minerals = 45 percent have dropped out of the community within the last five to 10 years."

Meanwhile, the two other streams included in the report remained stable or showed improved signs of diversity. Pinehurst Branch remained stable with high percentages of small minnow mayflies buoying its score. And Normanstone Run, where the proportion of mayflies and caddisflies has been increasing, posted some of its highest diversity scores yet over the last eight years.

All three streams monitored by the ANS are located in forested stream valley parks that help buffer the effects of the surrounding residential communities. But the streams still suffer eroded banks, sediment pollution and other impacts urban environs

from their urban environs. Still. ANS director of conservation

Eliza Cava said that Rock Creek's system is more diverse than many think it is.

"A lot of people in DC really enjoy the landscape and beauty of Rock Creek as a backdrop for recreation or meditation, but it's sometimes hard to imagine there's a lot of life in it," she said, before listing some of her favorites: eels, salamanders, dragonflies, mussels. "There are all these animals that spend part or all of their life cycles in these streams with us."

To learn how to become a water quality monitoring volunteer with the Audubon Naturalist Society, visit anshome.org/water-quality-monitoring.

This spring, water quality monitoring in the District will expand to include bacteria testing under a grant from the District Department of Energy and Environment. To learn more or for volunteer training, visit anacostiariverkeeper.org/our-river/ dc-water-watch or potomacriverkeepernetwork.org/be-a-water-qualitymonitoring-volunteer.

> Organic Matter = 5 percent Water = 25 percent

Bay Buddies Answers to Grounded on page 38. 1. Eastern Mole 2. Marsh Slug 3. Belted Kingfisher 4. Tiger Salamander 5. Mining Bee

### James River grants to pay for riparian buffers, precision ag techniques

Web-based app helped VEE decide which projects would be the most effective use of funds.

By SARAH VOGELSONG

The Virginia Environmental Endowment is handing out the first round of grant funds in a multiyear program to benefit the James River and "precision" is its key watchword.

"We were very deliberate about the way we were going to spend the money," said VEE Executive Director Joseph Maroon. "We were hoping right from the beginning that the projects we would be able to select would help to fill a critical gap or really make a substantial improvement in the water quality of the James."

This December, the VEE announced that it would award a total of \$4.56 million to six projects throughout the watershed as part of its James River Water Quality Improvement Program. This initiative, which places \$15.595 million in the VEE's hands, was established in 2017–18 as part of a state and federal agreement with Dominion Energy to mitigate the environmental impacts of a high-voltage transmission line across the James between the Surry nuclear power station and Jamestown.

The first round of grants represents almost 30 percent of the mitigation funds. According to Maroon, the VEE Board of Directors received 25 proposals amounting to about \$40 million in funding requests.

Projects were evaluated using the Restoration Planner, a web-based "precision conservation" application developed by the Chesapeake Conservancy that allows users to access environmental data about specific parcels of land and the potential impacts a given project could have on them.

Maroon has called the Planner a "key factor" in the VEE's decisionmaking that "ensures that we are investing our efforts and private funds in the most effective way."

A little more than half of the funds disbursed in the first round will go toward planting and widening streamside buffers, with more than \$1.6 million awarded to the James River Association and \$750,000 to the Virginia Department of Forestry for these purposes in the Middle James region.

"We're hoping between the two that we'll have a substantial improvement in the amount of buffers along the James," Maroon said.

Streamside or riparian buffers, usually planted with native trees, shrubs and grasses, are sometimes called "living filters." They are extensively



The Virginia Environmental Endowment has awarded \$4.56 million to six projects as part of its James River Water Quality Improvement Program. The James, shown here just outside Mayo's Island, near Richmond, originates in the Appalachian Mountains and flows into the Chesapeake Bay at Norfolk. (Sarah Vogelsong)

used in water quality improvement efforts because of their ability to decrease the quantities of nitrogen, phosphorus and sediment that flow into streams and rivers. These demonstrated effects led them to be identified as one of the VEE's five funding priorities for the James River grant program.

In line with the goal of maximizing investments, the James River Association will aim to establish buffers in "priority restoration opportunity areas." Some of the grant money provided to the Department of Forestry will go toward hiring a coordinator to oversee efforts.

Another award that looks to precision techniques is the \$640,000 grant to the Colonial Soil & Water Conservation District, which will work with the Henricopolis Soil & Water Conservation District to expand the use of precision agriculture techniques. Maroon called such techniques "the way of the future."

An approach to agriculture that harnesses technology such as global positioning and geographic information systems, sensors, and satellite imaging, precision agriculture allows farmers to collect highly specialized data about different sections of their fields, then adapt their practices as needed. For example, rather than applying the same amount of pesticide or fertilizer uniformly to a field, the farmer can adjust rates of application depending on exactly how much is needed in each management zone. Conservationists have hailed

precision agriculture as a win-win: Not only do these techniques reduce waste of resources and benefit the farmer's bottom line, they also reduce the quantity of excess nutrients that run off fields into bodies of water.

According to Tom Dunlap, a conservation specialist with the Colonial SWCD, the proposal was "really dictated by the producers we have in our region."

Comprising Charles City, James City, New Kent and York counties as well as the city of Williamsburg, the Colonial District is dominated by rowcrop producers, a popular candidate for precision agriculture techniques because of the scale and relative uniformity of their operations.

An estimated 10 percent of farms in the Colonial District used precision agriculture in 2017. Dunlap said that he hopes that the new initiative, christened the Decision Agriculture & Precision Agriculture program, will be able to work with 40 to 50 row-crop producers in the region. All farmers whose land falls in the James River watershed within Charles City, James City, New Kent and Henrico counties are eligible to participate.

In addition to offering education and technical support to farmers interested in precision agriculture, the program will establish a cost-share framework to reimburse farmers for engaging in conservation practices. "It's easy to forget in the era when you have GPS receivers on top of all your new equipment ... but not everybody lives with the type of budget where they can afford a new halfmillion-dollar combine," Dunlap said.

The other three VEE grant recipients are Trout Unlimited, which received \$480,350 to assist with conservation projects in Highland and Bath counties; James City County, which received \$781,900 to stabilize shorelines in Chickahominy Riverfront Park; and the Virginia Department of Health, which received \$300,000, supplemented by an additional \$200,000 from the Smithfield Foundation, for a cost-share program to repair and replace failing septic systems in James City, Isle of Wight and Surry counties.

The latter project fulfills yet another of the grant program's targets by investing in the area that is expected to feel the greatest effects from the construction of the first leg of Dominion's new transmission line.

With two projects focused on the Middle James, three on the Lower and one on the Upper, Maroon noted that the awardees encompass "a nice geographic spread."

Based on estimates from tools such as the Chesapeake Assessment Scenario Tool, the VEE expects the six projects to ultimately reduce the amount of nutrient and sediment pollution flowing into the James River by more than 4 million pounds annually.

### Solar facility planned in Southern MD forest under fire

☆ Two projects, one for Georgetown University, pose trade-offs between climate action, woodland conservation.By TIMOTHY B. WHEELER

Standing in a clearing surrounded by trees, with the sun peeking through clouds, Edwin Moses looked around and declared the mostly wooded site in Southern Maryland a "fantastic" spot to install thousands of photovoltaic panels.

Therein lies an apparent clash of environmental ideals. The solar energy company that Moses works for wants to build a pair of renewable energy projects that would help fight climate change — but in the process, they would clear approximately 400 acres of trees from the heavily forested Nanjemoy Peninsula in Charles County.

That's upsetting to some local residents and environmentalists, who otherwise support climate-friendly renewable energy. They contend that the state's remaining forestland shouldn't be sacrificed for energy production, even for something as "green" as solar panels.

Origis Energy USA, based in Miami, plans to build one of its projects, a 32.5-megawatt solar energy facility, on a mostly wooded 537-acre tract near La Plata to serve Georgetown University. The project, which would clear 210 acres of trees, would help the school shrink its carbon footprint by furnishing nearly half the electricity consumed on its District of Columbia campus.

"This amount of solar on this site is a fantastic use of the property," said Moses, managing director of project development for Origis.

Just a few miles away on Ripley Road, the company is preparing to build a second, 27.5-megawatt solar facility that on a sunny day would generate enough electricity to power nearly 5,600 homes. That project would remove another 190 acres of trees from a 300-acre forest.

Origis has pledged to permanently preserve the uncleared portions of both sites and to preserve more forested acres on the peninsula than it plans to clear.

But opponents say the two projects will harm the local environment and the Chesapeake Bay. By carving up one of a relative handful of large forested areas left in the state, the projects will diminish the region's bird populations and threaten water quality, critics say.

"It's really our version of mountaintop removal," said Linda Redding, who lives on Nanjemoy Creek, downstream from the Georgetown project on Shugart Valley Place. "In light of climate change, we should be saving all our forests. We can't disconnect climate change from our forests or the health of the Bay."

The smaller project has the major approvals it needs to go forward, but the



Lucidity Information Design, LLC

larger one planned for Georgetown still needs state permits.

Watershed groups, birders and smart growth advocates have appealed to Georgetown to back out, so far without success. Now they are urging the Maryland Department of the Environment to deny the necessary permits.

Georgetown University officials, who publicly hailed the deal in 2017, aren't talking to reporters now. Matt Hill, media relations manager, emailed a statement saying that the school is "deeply committed" to reducing its greenhouse gas emissions and that the project benefits far outweigh the carbon sequestration value of the forest to be removed. He wrote that the school would retain an unidentified third-party expert to see that the project is "conducted in an ecologically responsible way."

The Charles County debate is the latest in a series over where to build big renewable energy projects in Maryland. Residents in some Baltimore suburbs and rural Eastern Shore counties have objected to seeing solar panels take over farm fields that once grew grain and hay. Ocean City officials oppose the huge wind turbines planned offshore there.

Those and other projects are popping up to meet a Maryland law that calls for 25 percent of the state's power to come from renewable sources by 2020. Lawmakers are considering doubling that goal, to require 50 percent of the state's energy be from renewable sources by 2030. Solar would have to account for 14.5 percent, nearly six times what's now mandated.

The Charles County solar flap also comes amid a contentious debate over whether Maryland is doing enough to conserve its remaining forests. Environmentalists say the state's forest conservation law, passed in 1991, has major loopholes. Some developers and local and state officials dispute that and have so far blocked legislation to strengthen it. Environmentalists are trying again this year with a trio of bills.

The fight in Charles County is as much about land use as it is about renewable energy. In the last 40 years, portions of the county have been transformed from farm country to sprawling Washington, DC, area bedroom communities. Local community activists have sought to preserve the remaining rural areas, including Mattawoman Creek, a high-quality tributary of the Potomac River.

In 2016, the county adopted a new land use plan that calls for

steering future growth to already developed areas. The plan seeks to preserve large forested areas but also encourages renewable energy development.

The Nanjemoy Peninsula itself was identified by the state Department of Natural Resources as a "targeted ecological area," a designation meant to guide government land acquisition for parks and nature preserves. The DNR staff gave the parcel planned for the Georgetown project high marks for its wildlife habitat, proximity to protected lands and value in buffering a pair of high-quality streams.

The site also is in what the Audubon Society calls an "Important Bird Area" because of the habitat it provides for species that only dwell deep in the woods.

"Obviously, we support renewable energy," said Kimberly Golden Brandt, director of Smart Growth Maryland. But, she added, "We don't support clearing hundreds of acres of trees in a site with this kind of status when there are lots of other sites available."

Moses pointed out that neither the DNR nor Audubon designations carries any official weight. The two tracts are privately owned, he said, and portions of each have been legally logged for timber in the past.

John Hungerford, a lawyer representing one member of the family that owns the larger site, said they would like to get some financial benefit from the long-held former farmland. If Origis does not exercise its option to buy it, Hungerford said, the owners could legally timber or mine the land, then sell it for development, albeit for only a limited number of homes. The solar project would preserve more trees and wildlife habitat, he suggested, and better preserve the area's rural character.

Moses said the company believes that the benefits of the projects it plans in Charles County outweigh any downsides.

"Balance is what everyone needs," he said, "and we think we struck it really well here."

But birders and environmentalists insist it's a bad trade-off. "This is the largest forest in southern Maryland," said Bonnie Bick, a longtime Charles County environmental activist. The value of the forest goes way beyond carbon sequestration, she argued. "It's really the biodiversity, the protection from fragmentation. It's the water quality impact."

Many community activists say that instead of gobbling up farmland and forest, solar projects should go on rooftops, parking lots, closed landfills and brownfields, those former industrial or commercial sites where fears of contamination have prevented redevelopment.

But Moses said costs and technical issues render many of those kinds of sites untenable for large-scale solar projects.

Sen. Paul Pinsky, a Prince George's County Democrat who chairs his chamber's environmental committee, said that repeated disputes over solar development threaten to stymie the renewable energy push in Maryland.

"It's nuts — we need a blueprint," he said. He has introduced a bill to create a commission to hammer out guidelines for siting future projects.

"As much as we want to put them on rooftops, that's not going to be enough," Pinsky said. The state needs a plan that stops "NIMBYism," he said, but also protects forests, prime farmland and lands near the Bay and its tidal tributaries.

A public hearing was scheduled Feb. 27 in La Plata on the wetlands and waterway permits that the Georgetown project needs. MDE Secretary Ben Grumbles, who also chairs Maryland's climate commission, said he believes that state and local governments need to work on "sequencing" solar siting decisions, to prioritize placing them where they don't conflict with other desirable land uses.

"Clean energy and environmental protection must go together," Grumbles said, "As we strive to meet our aggressive greenhouse gas reduction goals, we must also be aware of the local impacts."

### VA won't be penalized over menhaden regs if it stays under cap

➢ Move heads off legal showdown between state, ASMFC.

### BY KARL BLANKENSHIP

Virginia will not face penalties for failing to formally adopt new catch limits on Atlantic menhaden — as long as harvests stay within limits established by East Coast fishery managers.

The decision by the Atlantic States Marine Fisheries Commission in February headed off a potential legal showdown as to whether it had scientific justification for slashing the commercial menhaden harvest in the Bay in 2017, even as it raised catch limits along most of the coast.

Since then, the Virginia General Assembly has twice failed to adopt the commission's mandated annual Bay cap of 51,000 metric tons.

Failure to adopt the limit put the state out of compliance with the commission's regulations. As a result, the ASMFC could ask the U.S. Department of Commerce to impose a moratorium on all menhaden harvests in Virginia. Twice last year the ASMFC considered, but delayed, such an action.

Steven Bowman, who heads the Virginia Marine Resources Commission, said his agency monitored 2018 harvests both through catch records and aerial surveillance and would continue to do so. "The cap was not exceeded," he said. "It did not come close to being exceeded."

"It has been a difficult situation," Bowman added. "We believe we have done our best as far as doing what is the intent of the [ASMFC]."

Robert Boyles of the South Carolina Department of Natural Resources made the motion to indefinitely postpone action. Boyles said the ASMFC was on shaky legal ground to act against Virginia because harvests in state waters were still less than the commission's recommendations. "It is important to note that the law doesn't support a noncompliance finding here," he said. "That is the hard and fast fact."

But, Boyles noted, "if the cap had been exceeded, I would have a much different take on the status of this issue." The commission voted 17–1 to hold

off any action unless the cap is exceeded.

It was the latest chapter in the longrunning dispute over how to manage menhaden, a small, oily fish that few people eat but is an important food for many fish, birds and marine mammals.

Conservation groups and recreational anglers have long contended that Omega Protein, which operates a fishing fleet out of Reedville, VA, harvests too many menhaden from the Bay, leaving too few for striped bass, osprey and other predators.



While no one disputes that menhaden are ecologically important, scientists have struggled for years to determine whether harvests are adversely affecting other species. (Dave Harp)

Omega — which turns menhaden into fish oil, animal feed and other products catches about 75 percent of the menhaden harvested along the East Coast, with the rest being captured by smaller operations that sell the fish for bait.

Worried that Omega's fleet was taking too many fish out of the Bay, the ASMFC first took action in 2006, capping the company's Bay harvests at 109,020 metric tons, an average of the previous five years of catches from the Chesapeake. The commission lowered that cap to 87,216 metric tons in 2013, when it reduced all harvests by 20 percent.

It further cut the cap to 51,000 metric tons last year — a move Omega strongly opposed — even though catches along the coast were increased in response to a new stock assessment showing a healthy menhaden population.

Ben Landry, a spokesman for Omega, said the company's 2018 Bay harvest was around 35,000 metric tons, well below the cap and about a third of what it averaged when the original cap was established. He said the company's boat captains prefer to fish off the Virginia coast where menhaden are generally larger and can be caught with less effort than in the Bay.

But Omega has opposed efforts to further curtail catches in the Chesapeake, saying such action lacks a scientific basis and would limit the company's options if conditions change. Landry said the commission's decision "signals their acknowledgement that the basis for the reduced Bay cap was not going to meet federal standards."

At its meeting last August, an attorney from the National Marine Fisheries Service warned the ASMFC that the Commerce Department might not uphold action against Virginia if the commission did not have an adequate scientific basis for the Bay cap.

Conservation groups were disappointed to see action delayed. "It's

good that the board maintained the importance of the Chesapeake Bay cap," said Chris Moore, regional ecosystem scientist for the Chesapeake Bay Foundation. "It's unfortunate that we continue to be in this situation where Virginia is not fully in compliance with a plan that was overwhelming adopted."

Recreational fishermen and conservation groups contend that the 2017 assessment, which found the menhaden stock to be in good shape, was based on the status of the entire coastal stock and was not specific to the Bay.

"I think there are a lot of ecological signals pointing to a problem in the Bay," said Kate Wilke, director of The Nature Conservancy's Mid-Atlantic Marine Program.

Conservation groups have long argued that the Bay is an important nursery area for many species that depend on menhaden and that these species may suffer if fishing causes "localized depletion" of menhaden.

While no one disputes that menhaden are ecologically important, scientists have struggled for years to determine whether harvests in the Bay are adversely affecting other species.

A review of scientific research about the menhaden's role in the Bay ecosystem prepared by ASMFC staff for the February meeting didn't draw any firm conclusions on the issue.

It said demand for "forage" species, such as menhaden, has increased in recent decades in the Bay with a rise in the number of fish and bird predators; menhaden can make up a significant portion of their diets, especially when menhaden are abundant.

In some cases, it said, the low abundance of menhaden might be linked to adverse impacts on some species. But the review also cautioned that the Bay food web is impacted by many factors and "parsing out the importance of menhaden abundance alone is difficult."

Some help could be on its way, as the ASMFC's technical advisers have been working to better account for the menhaden's ecological role. Their findings are expected late this year. Still, that effort is looking at the coastwide stock, and it's unclear the extent to which it will help to address Bay-specific concerns.

Andrew Shiels of the Pennsylvania Fish and Boat Commission cast the lone vote against the ASMFC's recent decision. Shiels said he would like more assurance that new information will be available regarding the Chesapeake.

"What brought us here today is what is going on in the Bay," Shiels said. "That may be more important than the coastwide analysis."

### **STRIPERS** FROM PAGE 1

needed to restore the stock to an acceptable level.

"We know it is going to be pretty drastic," cautioned John Clark, of the Delaware Division of Fish and Wildlife, a member of the board.

Striped bass, also known as rockfish, is one of the most popular sport and commercial species in the Bay and along the mid-Atlantic coast — the fish is even depicted on the Maryland state flag.

Overharvesting, though, drove the population to record-low levels in the early 1980s. Widespread concern over the fate of the stock sparked a federal law that gave more power to enforce the ASMFC management plan for the species, which previously had been voluntary, resulting in steep fishing reductions. As part of the effort, Maryland closed its fishery for five years, and other states enacted shorter moratoriums.

The population rebounded, allowing harvests to gradually resume, starting in 1990. The stock was declared "recovered" by 1995, a result heralded as a fisheries management success at a time when many other species were in peril.

In the wake of its success, Congress passed a law requiring all East Coast states to adhere to ASMFC management plans or face moratoriums. By the early 2000s, the coastwide striped bass population had reached levels not seen in decades.

The recovery was helped by a period of extremely high reproductive success for striped bass, a species that lives much of its life in the ocean but returns to coastal rivers to spawn. In a 13-year span from 1993 through 2005, reproduction was at or above the long-term average 10 times in the Maryland Young-of-Year index, which is historically one of the best predictors of coastwide striped bass abundance.

Since then, reproductive success has been poorer, with a few good years mixed with several poor ones. As a result, the number of young striped bass "recruited" into the population has generally been declining since the mid-2000s.

Successful reproduction requires two things: lots of eggs and favorable weather conditions that allow larvae to survive long enough to be "recruited" into the overall population.

Some research suggests that certain climate patterns produce conditions that persist for a decade or more and are generally favorable (typically resulting in wet springs) or unfavorable (generally dry springs) for striped bass recruitment. While there may still be year-to-year variations, those long-term patterns can greatly affect recruitment success over time.

Because they can't control the weather, managers have tried to keep the abundance of mature female fish high to



*As other species have declined, there has been an increasing focus on catching striped bass. (Dave Harp)* 

produce lots of eggs that will improve the chances of a strong "year class" of young when the conditions are right.

But spawning stock biomass, a measure of the adult female stock, has been declining steadily since 2010, according to the new preliminary assessment. In 2017, the estimated spawning stock biomass fell to 68,476 metric tons. That's well below the management threshold of 91,436 metric tons — the estimated amount in 1995 when the population was declared "recovered."

The assessment also shows that the spawning biomass has been below the threshold since 2012, meaning that the stock has been overfished. The scientists producing the assessment indicated strong confidence in that conclusion.

"The probability is very high that that is the case," said Mike Celestino, a member of the ASMFC's Assessment Science Committee who briefed the commission on the findings.

Part of the reason for the assessment's worse-than-expected results is new data showing that mortality from recreational fishing was higher than previously thought. Of particular concern was an increase in the number of "dead discards"

— fish that die after being released by anglers. The assessment estimates that 3.4 million striped bass died after being caught and handled by anglers in 2017. That was 48 percent of all striped bass killed by all fishing activities that year and higher than the 2.9 million fish that were kept by recreational anglers. Biologists estimate that about 9 percent of fish die after being handled.

Some fishery managers say that means previous management actions to protect the population — which imposed new minimum catch sizes — may have backfired. Because the minimum size was increased in 2015, they say the number of fish that were handled and ultimately died may also have increased as anglers tossed back more small fish while trying to catch one of legal size.

"We need to rethink what we are doing," Luisi said. "Increasing minimum sizes as a mechanism for reducing harvest only leads to more dead discards. Dead discards is a big problem."

A number of fishery managers indicated they would like to see the commission consider a broader array of options to reduce harvest. That might include things like gear restrictions or shorter seasons, which could reduce the number of fish being handled. Maryland, for instance, has been requiring the use of a less-lethal type of hook for certain fishing techniques during warm seasons when fish are more stressed and the mortality of released fish is higher.

Another problem, Luisi and others say, is that as other species have declined, there has been an increasing focus on catching striped bass. And, some say management plans need to better account for changes in technology that help anglers find fish and use social media to quickly share hot spots with others and increase catches.

"The fish can't escape the fisherman anymore," said Martin Gary, executive director of the Potomac River Fisheries Commission. Further, Gary said, poor water quality — such as areas with low-oxygen levels — increasingly lead fish to congregate and make them easier to target.

"From my perspective," he said, "I think we are going to need every tool available to us to do the best job we can to get this resource back to where it needs to be."

Another possible topic for ASMFC discussion is the current goal of maintaining a spawning stock at or above the 1995

level. Some contend that this reference point for managing the stock could be unrealistically high, especially for a species whose reproduction is so variable.

"I do anticipate a conversation about the reference points," said Max Appelman, fishery management plan coordinator for the ASMFC.

Any actions involving striped bass are certain to spur passionate debate. Many recreational anglers have long sought to declare striped bass a "game fish," which would prohibit commercial catches, and those calls are likely to be amplified in the wake of the assessment's findings.

But, said Robert Newberry, chair of the Delmarva Fisheries Association, a seafood industry group, the total coastal commercial harvest in recent years has been 10 percent or less of the entire catch and is limited by a fixed poundage quota, unlike the recreational fishery.

More focus should go toward dealing with the dead discards of anglers, he said. "They have always found a way to wiggle out of being held accountable for the amount of fish they are catching and destroying," Newberry said.

David Sikorski, executive director of the Coastal Conservation Association – Maryland, said he wasn't surprised at the estimated number of dead discards, given the popularity of striped bass, which migrate along the most populous part of the coast.

While that number was high, he said, it shows that about 37 million fish were actually caught, with many anglers simply enjoying the catching and releasing of fish. "That's a lot of boats, a lot of tackle, a lot of people out on the water accessing the resource," he said.

Sikorski said the overriding problem for striped bass has been low reproductive success in recent years, and that more needs to done to improve habitats and water quality to help young fish survive.

He said anglers, many of whom supported more aggressive action to reduce catches in 2015, would like to see states act quickly to protect the stock, including new restrictions this year. "We are going to be facing large cuts without a doubt," Sikorski added.

While most everyone agrees on the need to act, many caution that the stock is nowhere near the crisis level that spurred the previous moratorium. Today's spawning stock biomass, while declining, is still four times higher than it was in the early 1980s.

"We're not in crisis mode with this," said Chris Moore, regional ecosystem scientist for the Chesapeake Bay Foundation. "We're not in a situation like we were in the early '80s when we really needed to make huge changes in the way we managed the fishery. But we have a stock that hasn't performed as well as we would like it to for the last 10 years or so, and we need to make the necessary adjustments."

### **DRONES** FROM PAGE 1

of Bay grasses and detect the presence of harmful algal blooms in the summer. Riverkeepers are using the flyers to keep an eye on industrial facilities and take stunning footage of the waterways they're working to protect.

Many of the Chesapeake region's riverkeepers regularly use drones to help identify sources of pollutants, collect evidence for legal cases and regulatory complaints, or create promotional videos about their work.

"We could potentially get all of the riverkeepers together and have not only a Navy but an Air Force at this point," said James Riverkeeper Jamie Brunkow.

Choptank Riverkeeper Matt Pluta agreed. He said it's become known around the Chester and Sassafras rivers he oversees that the riverkeepers have a drone, "so it's been pretty effective so far."

Pluta has used the drone to track the expansion of Bay grass beds to ensure they are being protected. He also used it to showcase a two-stage ditch his organization helped construct on the edge of an agricultural field in Talbot County, MD, to reduce pollution in nearby waterways. In the footage shared on social media, the drone provides a bird's-eye view of the altered ditch designed to slow and filter nutrient-rich runoff before it reaches the river.

"The drone has allowed us to capture these projects in a way that we were not able to in the past," Pluta said.

Upper Potomac Riverkeeper Brent Walls has become the resident drone expert among some riverkeepers, many of whom have purchased the equipment in the last year or two. Walls has been flying drones for at least three years and navigating remote-controlled gadgets since childhood.

Walls recently upgraded his personal drone to the DJI Mavic Pro, which starts at about \$800, and he uses it frequently for work. He even found floating footwear for the drone that allows it to land on the water — a product he's shared with other rivekeepers.

On a January day, Walls mounted a 360-degree camera beneath his cameraequipped flyer to create a ride-along experience for Facebook followers while he navigated the drone over a snow-lined Antietam Creek.

"Being able to see something from the air gives you a whole new perspective," Walls said. "The whole point of social media is to keep people engaged so when you need them to act — to write a letter or show up at an event in force — they're there. This is one tool I use all the time."

In the past, Walls would have to hire commercial pilots to gather aerial imagery or to keep an eye on an industrial facility he suspected was polluting a nearby waterway. Now, he can get a drone up in the air and over the facility



Assistant professor Donglai Gong of the Virginia Institute of Marine Science and his team use one aerial drone to photograph another, with the York River and VIMS campus in the background (© D. Gong/Virginia Institute of Marine Science)

within a few hours. Sophisticated drone software makes it easy to edit videos on a smartphone and post them online as soon as they're made.

Walls used the drone this summer to

help Shenandoah Riverkeeper Mark Frondorf track the source of pollution that caused a sudden algae bloom in the river. Recently, the drone has helped Walls track oil seeps from a power plant and keep tabs on a mining facility's stormwater pond, which he suspects wasn't properly

constructed. But flying the expensive equipment, especially near privately owned facilities, isn't for the faint of heart — or the untrained.

Walls maintains a drone pilot license (Part 107) with the FAA to use the equipment in a businesslike or legal capacity. Hobby flyers who navigate their aircraft in a public park don't necessarily need a license, but Walls encourages volunteers working for environmental causes to get one. That additional training has given him confidence about where it is and is not legal to fly his drone and ensures that the images he captures will be admissible in court should they become helpful for a legal case.

He also abides by a personal code by steering clear of residential areas and not interfering with any operations occurring on the ground or in the air.

"I want my toy to come back every time it goes up," Walls said. Cunningham, with the Pipeline Compliance Surveillance Initiative, also requires all of his volunteers to acquire the FAA's drone pilot license, particularly if they plan to collect images to be used in court or regulatory cases. So far, he's

In the past, Riverkeeper Brent Walls would have to hire commercial pilots to gather aerial imagery or to keep an eye on an industrial facility he suspected was polluting a nearby waterway. Now, he can get a drone up in the air and over the facility within a few hours.

trained more than a dozen volunteers to use their drones to monitor construction of the Atlantic Coast Pipeline, which began in West Virginia last year before it was halted in late 2018.

Drone imagery of environmental damage caused by construction of the Mountain Valley Pipeline, which

began winding its way through Virginia's southwest corner in 2018, contributed to a regulatory crackdown on the project that has halted its progress heading into the new year. At a State Water Control Board meeting in August, advocates held up aerial images of sediment-laden water washing off construction sites onto roads and into waterways.

The images, also sent directly to water board members, provided additional evidence of the more than 300 environmental violations state regulators cited in a lawsuit filed in December against the pipeline company.

Though construction on the Atlantic Coast Pipeline in the Chesapeake Bay portion of Virginia has not yet begun, Cunningham said his trainees are ready to monitor it when and if it does. "Most of the folks I've trained are here in Virginia, and they're like, 'Let me at 'em!'" he said of their eagerness to fly. "We'll get [the drones] in the air when we need to." Along with drones, the Pipeline CSI works with a volunteer pilot to regularly capture imagery along the entire length of the pipeline project. Cunningham uses advanced software tools to splice that imagery together into an interactive online map that helps advocates compare construction with the project's approved plans and report any violations.

Donglai Gong, an assistant professor at the Virginia Institute of Marine Science, said researchers are just beginning to test the waters of how drones can expand their work.

He and others at VIMS use drone imagery to measure the reach of submerged aquatic vegetation, harmful algal blooms and oil spills — all of them more visible and measurable from overhead when the conditions are right. In the very near future, Gong hopes to deployed more advanced technology to not only measure but also identify different plant species from far above the water's surface.

For the last two summers, Gong has used midlevel drones to measure the breadth and movement of algal blooms in the York River, where the resultant reddish brown tint is clearly visible from overhead. Once a bloom was spotted, Gong's team collected samples by boat to determine the algal species, then deploy a drone to see how far it was spreading.

And soon that final hand-sampling step will be unnecessary. VIMS is in the process of acquiring new sensors, ranging in price from \$40,000 to \$70,000, that will allow the equipment to both identify and measure algal species from the air.

"The true impact will be seen when we can scale this effort up with these advanced sensors," Gong said. "The technology is available, and multiple groups are interested in using it."

That technology is getting more accessible every day. Walls, the Upper Potomac Riverkeeper, plans to use thermal camera imagery this year to measure how heated water discharges from power plants are impacting cool-temperature streams, for example.

VIMS researchers who study coastal forest and marsh habitats could use the same sensors to determine the health of a forest and how it's being impacted by rising sea levels. VIMS, which is part of the College of William & Mary and is located in Gloucester Point, VA, also offers classes to train graduate students on using drones for their marine science work. "In the future, researchers will use [drones] regularly," Gong said.

Gong led a session in March at the Virginia Water Monitoring Council on using drones to more effectively monitor local water quality and respond to emergencies, and he's been asked to lead more like it.

"[Drones are] a wonderful tool," he said. "They can allow you to look at a problem or an issue from different perspectives – literally. You just have to make sure you do it safely and legally."

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A heron scopes out a fisherman's net on the Little Blackwater River in Southern Maryland. (Dave Harp)

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from page 27

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This view from Belle Isle State Park in Lancaster, VA, shows Deep Creek, which flows into the Rappahannock River. (Dave Harp)

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Continued on page 29

### BAY JOURNAL • MARCH 2019

#### FROM PAGE 28

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Recycled crab pot corks are prepared for a new coat of paint to start the spring season on Smith Island. (Dave Harp)

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WYE HALL plant a tree, leave a legacy

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A.

# <sup>30</sup> **FORUM** COMMENTARY • LETTERS • PERSPECTIVES Lure of mainland tugs at roots – and hearts – of Smith Islanders

### BY TOM HORTON

In the spring of 1987, I made the best move of my life - to remote Smith Island, MD, whose fisherfolk had endured for more than three centuries, 10 miles offshore in the center of Chesapeake Bay.

It never crossed my mind I'd end up making a book on the place, An Island Out of Time (W.W. Norton, 1997), and now a short film of the same name. The new Bay Journal production, An Island Out of Time, which I created with Sandy Cannon-Brown and Dave Harp, debuts at the Environmental Film Festival in the Nation's Capital in March and airs at 8 p.m. April 23 on Maryland Public Television. The title not only reflects the old-timey culture of the island, but also underscores its uncertain future in the face of steady erosion, rising seas and simply from youth moving off — "craving the world," as the islanders put it.

I moved to Smith Island to do education work for the Chesapeake Bay Foundation, to experience a place where nature still shaped lives in an era when humans were dominating natural systems across the globe. Sun and moon rose at one end of my street and set at the other. Half a minute's walk either way brought you to tidewater. The doctor made house calls by skiff, as did the preacher.

The book is 20 years old, and some of the landscapes in it are now beneath the waves. The island's resident population has fallen from nearly 500 to less than 200. Fewer than 35 remain year-round where I resided — in Tylerton (population 124 then), one of three hamlets that make up Smith Island.

After a delightsome three-year immersion in a culture that paid serious attention to God above and blue crabs below, my family moved back to the mainland. But your heart never leaves a place like that. Tylerton has never ceased to draw me back, along with an increasing number of outside homeowners and tourists, lending hope that the island's not quite done. It helps that state and federal governments have put several million bucks of rock along the island's edges to ward off erosion.

One big storm could still overwhelm the place, whose elevation ranges from a few feet on down. Up to a point, the island survives better than you'd think, as there's little land there for storm surges to pile up on, as they do when they collide with the mainland.

Of more imminent concern, and the film's focus, is what my former next-door neighbors, Dwight and Mary Ada Marshall, are going to do. Will they finally pull the trigger and make the agonizing decision



The population in Smith Island's Tylerton is down to fewer than 35 year-round residents. Rising sea level and "craving the world" has led many of its inhabitants to move to the mainland. (Dave Harp)



Jamie Marshall ropes a piling during his winning run at the 2018 boat docking contest in Crisfield. (Dave Harp)

### Where to view the film

View An Island Out of Time, a new Bay Journal film by Tom Horton, Dave Harp and Sandy Cannon-Brown at 2 p.m. March 23 in the Carnegie Institute for Science at the Environmental Film Festival in the Nation's Capital. Or, watch at 8 p.m. April 23 on Maryland Public Television. The film will be available to view after May 1 at bayjournal.com/films.

they've mulled many times - leave Tylerton for the mainland, following all four of their children?

When a community like Tylerton gets down to a few dozen people, it's obvious every family counts. But the Marshalls, mainstays of the island economy and its store, count enough that Dave, Sandy and I decided to make our film about them.

Dwight's and Mary Ada's families hark back to the beginnings of Smith Island,



### Chesapeake

which is to say back to the beginning of colonial America. Dwight is from Drum Point, the old name for Tylerton, where about half of the surnames are Marshall. Before that, his people came from "Shankses" — an island he talks about as almost another country, though its remnants lie only several hundred yards southwest of the Marshalls' present house. In Dwight's lifetime, Shankses has been so eroded and reconfigured that "if Dad [Russell Marshall, who died in the 1970s] were to come back now, he'd be lost down there."

Mary Ada is an Evans from Smith

Island's "capital city" of Ewell, where her family's name predominates. Her dad. Elmer, was a prominent waterman, captain of a skipjack that was one of the prides of the island's fleet of boats that dredged oysters under sail all over the Maryland portion of the Chesapeake. She and Dwight met on the boat that ferried island high schoolers to the mainland, where they boarded Monday through Friday.

Theirs was to be a union of thoroughbreds,

still going strong half a century later. Dwight, like most island boys, was born to work the water: "We'd ride our bikes, pretending we were dredging oysters like vou would from a boat. And others would ride up pretending they were the law, coming to arrest us." (At the time, dredging was illegal.)

Other island watermen had bigger, faster boats and fished with more gear, but in decades of roaming the Chesapeake for the Baltimore Sun I encountered none more skilled at maximizing a living from the Bay's bounty. Dwight was a student of markets, phoning seafood buyers after a long day on the water, hopping a truck from Crisfield to check out New York's Fulton Fish Market. He installed a freezer to hold his catch and ran a seafood sales route on the mainland, working incredible hours to free himself from the daily market prices set by middlemen.

He was frugal enough to heat his crab shanty by burning castaway nylon rope he gathered from the shore on winter "progging" expeditions; he'd also recycle washed-up cork floats watermen used to mark their crab pots. In 1975, he invested what many deemed an extravagant sum in a newfangled "Fiberglas" workboat, but the Miss Marshall is still going strong, several engines later, long after her wooden peers rotted away.

He was adept at seizing opportunities few others knew existed. One winter, as other watermen complained of scarce oysters, he discovered troves of diamondback terrapins hibernating in the mud of remote marshes. One morning he caught enough on the way to visit Mary Ada in the hospital to offset much of her medical bill — "a bank withdrawal," one islander called it.



### FILM FROM PAGE 30

No wonder his little girl, Maria, answered a question in elementary school that asked her to name some of Earth's most precious natural resources: "turkles" (turtles).

Dwight talked about the "thrill of the chase," how he loved to range far and wide, exploring on the chance he'd hit a rich, undiscovered pocket of oysters. I came to think of him as the human equivalent of a top predator, like a great white shark. But then there was the day he landed with hundreds of terrapins bound for slaughter, and photographer Dave Harp cajoled him into posing with perhaps the biggest female we'd ever seen. Dwight did so reluctantly. When Dave finished, he said, "I was afraid of that. I got to lookin' her in the eye and now I got to throw her back." Many years later his youngest son, Jamie, would do the same thing with a fat speckled trout that Dwight had saved for the family's dinner.

When Dwight talked about all it took to be a top waterman on a place like Smith Island, with few fallback options, he'd add: "you need a wife who's that way too."

Indeed, for hard work, Mary Ada might have set the family standard, for many years rising at 2:30 a.m., picking 20 pounds of crabmeat and loading it aboard the 7 a.m. ferry to Crisfield, then cooking breakfast and getting the kids off to school and cleaning the house and processing several hundred soft crabs Dwight had caught, all before picking more crabs and rustling a multi-course dinner for Dwight and the four children. She also turned out highly regarded eight-layer chocolate cakes. She could bake one, ice it, and have the pans and bowls washed and put away in about 20 minutes.

On top of this, the two ran a grocery store to make extra money to send Dwight Jr. (Duke) to college. In her "spare" time, Mary Ada seemed always to have a home remodeling project going, and today what was once a modest bungalow is one of the island's handsomest homes. Then there were church duties, which on the island are many. Along with most islanders, Dwight and Mary Ada are devout Methodists in a way that is closer to the religion that swept down the Delmarva Peninsula some 250 years ago than it is to mainland churches.

Dwight, who turns 74 in March, is now the oldest citizen of Tylerton. He's undergone a quadruple heart bypass and has had both knees replaced. His crabbing schedule is "when I feel like it," mostly from a small aluminum skiff made for him by one of his sons, Kevin, a boatbuilder and welder.

As her husband has wound things down a bit, Mary Ada, now 71, and "sticking myself with a needle four times a day (diabetes) has upped her game. Those cakes she learned how to bake when she stood on a stool in her mother's kitchen have brought

## FORIM COMMENTARY • LETTERS • PERSPECTIVES



Dwight Marshall, now retired, says his crabbing schedule is "when I feel like it." Tylerton's oldest islander said the next day citizen, he has fished for crabs, oysters, terrapin and trout. (Dave Harp)



Mary Ada "the cake lady" Marshall makes eight-layer Smith Island cakes that are renowned beyond the island. She ships dozens of orders every week. (Dave Harp)

fame and a bit of fortune. Her renown as "the cake lady" has spread far beyond Tylerton — indeed she's shipping dozens of eight-layer concoctions as far off as Iraq every week, taking orders only by landline and buying bubble wrap in immense rolls.

She and other island ladies lobbied Maryland's legislature to designate the Smith Island eight-layer chocolate cake the state's official dessert. She's burned through at least a few sets of double ovens since. Television crews and college classes troop through her kitchen regularly. Her "other cakes" aren't shabby either - luscious one-third-pound crab cakes, the meat caught and picked fresh from island waters,

and sold daily at the Tylerton store. The Drum Point Market is owned by Duke, her oldest son, and managed by Mary Ada. The crab cakes draw boaters and tourists on the island ferry.

Nowadays in the summertime, Mary Ada usually has grandchildren visiting, ranging from toddlers to late teens. None will ever live in Tylerton — and, when their visits end and it's time to board the ferry to the mainland, none ever want to leave.

Mary Ada and Dwight talk about moving. "We're wearing out, like an old boat and an old engine," he said recently.

But Ada can only get so far into that conversation before she chokes up. Still, the unthinkable is becoming thinkable now.

She often describes their lives as "content," a word I've heard more on the island than the mainland, where people talk more about whether they're "happy" or not. "Content," if you go to the Latin root, literally means to bound or limit one's desires, and perhaps small islands, by their very nature, are bounded and insulated, confined by the surrounding waters.

So Sandy, Dave and I filmed on Smith Island through last summer into the fall. The Fourth of July drew so many people and children and dogs that for a day or two "it seemed like old times, when Tylerton was full of people," one in church.

We interviewed Duke

and Kevin and Jamie and Maria, the four Marshall kids who left, about their stories and what they want for their parents and what they hope for Tylerton. One thing's crystal clear: In spirit, none of them will ever leave this centuries-long home of Marshalls and Evanses.

Climate change and sea level rise is readily discussed these days with regard to low-lying Bay islands. But "education is what will be the death of this place," the late Paul Marshall told me when I moved to the island in 1987. He meant that younger generations would have options his never did, including the option to leave.

Once, during one of my endless discussions with Dwight about the prospects for more crabs and oysters in the Bay, Mary interrupted to say, "Oh, the Lord'll take care of that ... what I worry about is who's going to be left here for my son to marry."

I'm convinced most of us desperately want places like Tylerton to exist, perhaps to fill something lacking in our wider society. We need this even as the islanders pass our tour boats on their way to the mainland, craving the world.

Dave, Sandy and I knew going into this project that we might be recording the final act of an extraordinary family and culture. We were also determined that our efforts would celebrate the long-running play that is Smith Island and its people.

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.

# <sup>32</sup>**FORUN**

### You are never too young to save the Bay, its animals

It is important to save the Chesapeake Bay because of all of the Bay animals. If you don't help the animals, they will die. If the Bay animals die, we will not have any sea animals to eat.

There are things you can do to save the Chesapeake Bay. One way is to clean up the Bay.

You can also ride bikes more often to get rid of air pollution. Pollution can make the Bay animals sick.

Planting trees by the Bay can make the Bay healthy.

Don't dump anything down storm drains because it leads to the local river and eventually to the Bay.

You can save the Bay by only using the fish that you are going to eat and putting back the ones you aren't going to eat. It is important to keep fish in the Bay because they are part of the food chain. If the animals don't have fish to eat, then they will die, which will take food from another animal.

You should help to save the Chesapeake Bay. All of the animals are depending on you.

Jenna Burroughs, age 10

#### Save the trees, save the Bay

The *Bay Journal* is a joy because it covers the three states most influencing the life of the Chesapeake Bay — where I live.

You, as well as the Chesapeake Bay Foundation (and common sense), have emphasized the importance of trees to the health of the Bay numerous times. Therefore, I have been *very* concerned in recent years about the lives of the trees closest to, and bordering our Chesapeake Bay.

I drive across the Bay Bridge to my home on Kent Island a least once a week, if not more often. Both Route 2 and Route 301/50 (as well as the parallel College Parkway) are heavily wooded along both sides, as are the ramps leading to the highway. Those woods are heavily overgrown with obtrusive vine undergrowth climbing the tree trunks.

I also drive to Baltimore County using the JFK Expressway (Interstate 83), which borders the city's wonderful, but unkempt, Druid Hill Park overlooking the Jones Falls, which flows into the Patapsco River at Baltimore's Harbor — straight into the Bay.

In both areas, along the highway and into the woods behind the roads' edges, there is heavier and heavier wild grape and kudzu vine (I think) growth that threatens, and in some

### Commentary • Letters • Perspectives

### Lower Susquehanna flows led to lower nutrient loads Much has been written in the past

about how the Bay is recovering. Credit for the recovery is often given to the sewage treatment plant upgrades and to the work in the agricultural sector. Yet very little is ever mentioned about the fact that much of the improvement came at a time when the annual flows from the Susquehanna River were substantially below the previous nine-year average. Drier conditions from 2012 through 2017 resulted in significantly fewer nutrients being washed off the land and into the Bay. Average annual nutrient loads measured at the U.S. Geological Survey's River Input Monitoring network for the Susquehanna from 2003 through 2011 were 85,206 tons per year of nitrogen and 5.254 tons per year of phosphorus. But low flows from 2012 through 2017 reduced the average annual nitrogen and phosphorus loads by 35,000 and 3,300 tons respectively below the previous nine years.

The reduction in Bay loading caused by the six years of Susquehanna low flow was the more important contributor to nutrient loading reductions than the esti-

cases, has already claimed the lives of some of the trees there. This is about the fourth or fifth year that I have noticed how badly overgrown these wooded areas have become. This year, I noticed the [impact] those vines are beginning to have on trees.

When Donald Schaefer was governor, he hired a crew of arborists to care for, as well as plant, trees along the highway. That care seems to have been abandoned under recent regimes. If not addressed soon, this heavy growth is going to cause havoc for the health of the streams and rivers leading into the Bay as well as the Chesapeake itself.

I realize that the expense of an arborist crew would scare Gov. Larry Hogan and Comptroller Peter Franchot out of a full year's growth, but it seems to me that training state prisoners in tree care would certainly be a productive and healthy use of their inordinate amounts of free time. I have an acquaintance who owns a landscaping business and he hires parolees for his business with great success.

I hope you will alert those who are in a position to address this problem to become aware of how alarming it has become, and DO SOMETHING! Bettye B. Speed nell@atlanticbb.net

Average Susquehanna Nutrient Loads at Conowingo / tons per year						
	2003–11	2012–17	Average Reduction	2018 Estimate*		
Nitrogen	85,206	50,206	35,000	130,833		
Phosphorus	5,242	1,942	3,300	6,264		
*Based on monthly load versus flow regression						

mated man-made reductions for the entire 2003 through 2017 time period. Computer model data show that from 2003 to 2017, the nitrogen wastewater load to tidal waters was reduced Baywide by 14,763 tons (from 36,969 to 22,206 tons per year) and phosphorus by 1,494 tons (from 2,696 to 1,202 tons per year). During that same period, the ag sector nitrogen loads to tidal waters were reduced Baywide by 4,643 tons (from 64,694 to 60,051 tons per year) and phosphorus by 580 tons (from 2,646 to 2,066 tons per year).

Going forward from 2018, the man-made reductions will be important but they will not offset the estimated substantial 2018 loads from the Susquehanna of 130,833 tons of nitrogen and 6,264 tons of phosphorus, which are two to three times greater than the annual average load from 2012 to 2017. Fortunately, the Bay is very large and one year of very high flows and accompanying high loads will not be as detrimental as a sustained period of high flow and loads lasting several years. The volume of the Bay is roughly equal to a one year flow of 85,000 cubic feet of water per second flowing into it. The 2018 estimated calendar year freshwater flow to the Bay is 142,941 cfs and exceeds all the previous 19 years including high flow years of 2003, 2004 and 2011.

My river input load estimates for the Susquehanna are developed from the actual loads not the flow-normalized loads reported by the USGS site. My estimated model loads were reported from the Bay Programs Chesapeake Assessment Scenario Tool model. Wayne E Webb, retired USGS scientist Berryville, VA

### An Island Out of Time

a new Bay Journal film by Tom Horton, Dave Harp and Sandy Cannon-Brown



Environmental Film Festival in the Nation's Capital Carnegie Institute for Science March 23, 2PM

> Maryland Public Television April 23, 8PM

## FORUM COMMENTARY • LETTERS • PERSPECTIVES

How can we save oysters if we harvest them faster than they reproduce?

### By ALISON PROST

This year's Maryland General Assembly session marks a critical juncture for Chesapeake Bay oysters. Policies under debate in the halls of the legislature will chart the course for oysters' next 100 years. Now is the time to make the changes necessary to protect the oyster.

Before the session, the bad news arrived. In November, the state released the first comprehensive stock assessment of Maryland oysters. It found that the bivalves' population had declined by half since 1999 — from about 600 million adult oysters to the current population of 300 million. The population decline is bad for both the Bay's ecology and for the watermen who depend on the wild harvest to make their living.

The oyster's significant decline is a symptom of a long history of overharvesting, disease and pollution in the Bay. The current population of oysters in Maryland's portion of the Bay is less than 10 percent of the number of oysters harvested each year before 1900, according to the stock assessment.

While we can't expect to re-create the natural state of the Bay before significant human intervention, Maryland can't continue with business as usual. To reduce Bay pollutants, create more habitat for fish species and preserve the oyster for future generations, we must put Maryland on a path toward oyster recovery.

Two bills making their way through the Maryland General Assembly this year have the potential to make significant strides in this direction.

HB298/SB448 would permanently protect the state's five oyster restoration sanctuaries. The other bill, HB720/SB830, aims to install a transparent, consensus-based process to draft a new fishery management plan dedicated to increasing the overall population of oysters and ensuring the long-term sustainability of the fishery in Maryland.

The restoration sanctuaries are tributaries targeted by state and federal partners for large-scale oyster restoration. The first and largest restoration project, completed in 2015, is in Harris Creek on the Eastern Shore. Three hundred fifty acres of Harris Creek's bottom has been planted with about 2.5 billion spat since 2010.

The project is the largest sanctuary oyster restoration effort happening in



The current population of oysters in Maryland's portion of the Bay is less than 10 percent of the number of oysters harvested each year before 1900. (Dave Harp)

the world. It's an underwater laboratory where environmental scientists are making frequent discoveries.

One finding from the project is the ability of alternative substrates such as stone to support higher densities of oysters than traditional shell-based reefs. Reefs built with stone had four times the number of oysters on them than those built with shell bases, according to a National Oceanic and Atmospheric Administration study.

Oyster shell, which has traditionally been used in restoration and fishery replenishment, is becoming more expensive and difficult to obtain. Alternative substrate presents a way to efficiently create protected reefs in sanctuaries while preserving shell for activities such as oyster farming and replenishing harvest areas.

The restored tributary is also providing quantifiable environmental benefits. A 2018 Nature Conservancy study found that the oysters living at the restored reefs in the tributary can filter the full volume of Harris Creek in less than 10 days during summer months and have the potential to remove about one million pounds of nitrogen over a decade.

Despite these benefits, there is pressure from the oyster industry to allow harvesting on the restored reefs. HB298/SB448 will protect Maryland's five oyster restoration tributaries from harvesting forever, allowing them to expand their ecological benefits to the Bay as the oysters naturally grow and reproduce. The bill also helps to satisfy Maryland's obligation under the Chesapeake Bay Watershed Agreement to restore native oyster populations in five tributaries by 2025 and ensure their protection.

Protecting the oyster restoration tributaries, however, won't stop the species' decline in the rest of the Bay. That's why HB720/SB830 — the oyster fishery management plan bill is also needed. The stock assessment shows that Maryland's Department of Natural Resources has overseen an oyster fishery that allows harvesting at unsustainable rates for too long.

Maryland must not allow oysters to be harvested at a rate faster than they can reproduce if we are to ever restore the oyster population.

HB720/SB830 would require the DNR to convene a group of scientists, environmental advocates, watermen and seafood sellers to come to a consensus about ways to manage the oyster fishery to increase the bivalves' population. This process would allow each stakeholder to provide input and learn from others who may hold opposing views. The workgroup will provide recommendations on potential management strategies

to ensure sustainable oyster populations and a viable fishery harvest.

The result will be a consensusdriven and broadly supported set of recommendations that can advise the DNR on management strategies that can be used to reverse the decline of oysters in Maryland.

By permanently protecting sanctuaries and instituting stronger fisheries management plans, these two complementary bills provide a path to restore our iconic oyster and the marine life that depend on them. The tools are in hand. Now is the time for Bay-loving legislators and citizens to come together to save the oyster.

Alison Prost is the Chesapeake Bay Foundation's Maryland executive director.

### 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.



### Become a park guide

Cromwell Valley Park in Parkville, MD, Marshy Point in Middle River, MD and Eden Mill Nature Center in Pylesville, MD, need adult trail guides to help with programs, special events and animal care. Training takes place 10 a.m.-1 p.m. March 13 (Marshy Point), March 14 (Cromwell Valley) & March 15 (Eden Mill). Training will cover the most popular programs as well as the ecology of Cromwell Valley and Marshy Point. Each day features new subjects and techniques. Breakfast, snacks and coffee are provided, but participants should pack a lunch and drinks for the trip to Eden Mill. New guides pay a \$5 tuition fee. 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.

### Howard County Conservancy

The Howard County Conservancy in Woodstock and Elkridge, MD, needs adult volunteers to help with elementary and secondary school field trips. Field trips generally begin at 9 a.m. and end in the early afternoon, Monday through Friday. Volunteers lead small groups of students on hikes around the conservancy grounds and help with hands-on activities. All training sessions run from 9 a.m. to 12:30 p.m. Elementary sessions take place March 20, 27 and April 3; secondary session are on March 26 and June 3. (Áttendance at all sessions is not necessary.) Contact the conservancy for the location of each session. All sessions are free. Preregistration is recommended. Info: volunteer@hcconservancy.org. 410-465-8877.

#### **Prince William County cleanups**

The Prince William (VA) Soil and Water Conservation District invites volunteers to look into these projects:

SWater Quality Monitoring at Cedar Run: 10 a.m.–12:30 p.m. March 16 (rain date 3/30) at Evergreen Acres in Nokesville. Learn about this stream's health, how it interacts with agriculture as it joins the Occoquan River. Info: 571-379-7514, waterquality@pwswcd.org.

SPhase 4 Costco Manassas Cleanup Project: 9 a.m.−12 p.m. March 16 (rain date 3/30) at the stream behind Costco near the Bull Run Shopping Center. Earn student community service hours. Light refreshments provided. Wear boots; clothes will get dirty. Registration and info: waterquality@pwswcd.org, 571-379-8213.

Stream Cleanup / Powells Creek, Woodbridge: 9 a.m.–12 p.m. March 23 (rain date 3/30) Park along 15601 Northgate Dr., Montclair. Info: merrimacfarmvmn@gmail.com.

*■Water Quality Monitoring / Powells Creek, Woodbridge*: 10 a.m.–12:30 p.m. March 30. Residents are invited to support this stream's data collection, learn about area water quality. Info, directions: buckarvin@comcast.net.

### **Corsica Clean Stream**

Help the town of Centreville, MD, the Alliance for the Chesapeake Bay and Corsica River Conservancy clean up trash in the Corsica River watershed 12–4 p.m. April 7. Report to Centreville Wharf or Northbrook Community in Centreville. Gloves and bags will be provided. Info: CorsicaRiverConservancy@gmail.com.

### **Cromwell Valley Park**

Cromwell Valley Park in Parkville, MD, needs volunteers for:

➡ Habitat Restoration Team / Weed Warrior Days: 2–4 p.m. March 2, 13, 23 & 27 and April 3, 20, 24 & 27 and May 4, 8, 11, & 15. All ages (12 & younger w/ adult). Remove invasive species, install native ones and maintain habitat. Service hours available. Meet at Sherwood House parking lot. Registration required. Info: Itmitchell4@comcast.net.

■ Drop in Gardening: 9 a.m.–12 p.m. March 30 & April 6. Meet at Children's Garden. Individuals/families, ages 13+ Gloves, tools, water provided. Bring a hat, sunscreen. Registration not required. Info: info@cromwellvalleypark.org, 410-887-2503, cromwellvalleypark.org. For disability-related accommodations, call 410-887-5370 or 410-887-5319 (TTY), giving as much notice as possible.

### Paradise Creek Nature Park

Volunteer Service Days at Paradise Creek Nature Park in Portsmouth, VA, are scheduled March 16 & 30. Help pull invasive species and care for edible plants or maintain trails and recreation amenities. All ages are welcome (ages 11 & younger w/ adult.) Dress to get dirty; closed-toe shoes and long-pants are recommended. Bring insect repellent and a water bottle. Registration is required. Info: 757-392-7132, kfish@elizabethriver.org.

### Citizen scientist bird projects

Upcoming citizen scientist bird projects at Nixon Park in Jacobus, PA, include:

Service Feeder Watch: 8:30 a.m.– 4:30 p.m. Tuesdays & Wednesdays through April 3. Learn to identify common winter birds, collect data to help track bird populations. Info 717-428-1961. Registration is not required to drop in and observe.

### 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 closedtoe 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.

NestWatch: March–August. Various county parks. Become a certified Nestwatcher with the Cornell Lab of Ornithology's nest monitoring program. Volunteers visit boxes about twice a week in the breeding season to check on the progress of nesting birds. This is a long-term citizen science project that helps track trends in bird populations and environmental health. Info: 717-428-1961.

### Anita Leight Estuary Center

Volunteers are needed for these workdays at Anita C. Leight Estuary Center in Abingdon, MD:

Sinvasinators: 11 a.m.−12 p.m. March 24. Ages 14+ Remove invasive species, plant native ones. ID, removal techniques taught at workday. Wear sturdy shoes, long sleeves, work gloves.

Preregistration is required for both workdays. Info: 410-612-1688, 410-879-2000 x1688, otterpointcreek.org.

### Adopt-a-Stream program

The Prince William Soil & Water Conservation District in Manassas, VA, wants to ensure that stream cleanup volunteers have all of the support and supplies they need for trash removal projects. Participating groups receive an Adopt-A-Stream sign in recognition of their stewardship. To learn more, adopt a stream or get a proposed site, visit waterquality@pwswcd.org. Groups can 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 March, April and May 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@pgparks.com, 301-442-5657.

### **Magruder Woods**

Help Friends of Magruder Woods 9 a.m. to 1 p.m. the third Saturday in March, April and May remove invasive plants in the forested swamp in Hyattsville, MD. Meet at farthest end of parking lot. Info: Marc.Imlay@pgparks.com, 301-283-0808, (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. to 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 March, April and May remove invasive plants at Ruth Swann Park in Bryans Road. Meet at Ruth Swann Park-Potomac Branch Library parking lot. Bring lunch. Info: ialm@erols. com, 301-283-0808, (301-442-5657 day of event). Carpoolers meet at the Sierra Club MD Chapter office at 9 a.m. and return at 5 p.m. Carpool contact: 301-277-7111.

### **Creek Critters App**

The Audubon Naturalist's *Creek Critters App* empowers people to check on their local streams' health through finding and identifying the small organisms 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: cleanstreams@anshome.org.



**BULLETIN** FROM PAGE 34

### RESOURCES

#### Sea level rise study

The Eastern Shore Land Conservancy has released a report, Mainstreaming Sea Level Rise Preparedness in Local Planning and Policy on Maryland's Eastern Shore, to help local governments plan for impacts of sea level rise. The report is centered on projections for the Chesapeake and its tributaries in the years 2050 and 2100. Mapping for the project was conducted by the Eastern Shore Regional GIS Cooperative at Salisbury University. The maps illustrate sea level rise and the impacts of flooding on Eastern Shore communities, including the estimated number of buildings flooded and the economic impact of flood damage. The University of Maryland Environmental Finance Center used this information, along with best practices from communities nationwide, to develop recommendations for local governments to consider in capital improvement planning. The goal is to keep tax-funded projects protected in the face of sea level rise. Download the report at eslc.org/resilience. Info: jbass@eslc.org, 410-690-4603 x156.

#### 5 MD libraries offer fishing gear

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

#### Wetlands Work website

The Chesapeake Bay Program has launched *Wetlands Work* (wetlandswork.org). The site, developed by the Wetlands Workgroup, connects agricultural landowners with people and programs that can support wetland development and restoration on their land.

### Forestry board workshop

The Carroll County Forestry Board's Spring Thaw Workshop / Watershed Moments takes place 8 a.m. to 3 p.m. March 23 at the Wesley Freedom United Methodist Church in Sykesville, MD. The workshop includes a series of presentations by experts on topics ranging from flood risk management to protecting honeybees and other pollinators. Continuing education credits are available. Morning coffee, snacks and lunch is included in the registration fee of \$51.75/individual & \$77.48/couple. Registration is due by March 15. To register: carrollcountyforestryboard.org. Info: 410-848-9290, donnal.davis@maryland.gov.

### 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.

### 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 free to schools and organizations that do not have this equipment. The DEQ requests that participants use these kits as part of the EarthEcho Water Challenge (See worldwatermonitoringday.org). Groups with their own monitoring equipment can also participate. Request a kit at charles.torbeck@deq.virginia.gov. Provide an address, the 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.

#### **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. Info: baybackpack.com.

### FORUMS / WORKSHOPS

#### Saving the Patapsco

Benjamin Banneker Historical Park and Museum in Catonsville, MD, and the Patapsco Heritage Greenway invite the public to *Saving the Patapsco: 100 years of activism with Ned Tillman* at 2 p.m. March 31 in the museum. In this free presentation, Tillman will share the stories that made the river legendary, describe the people who have been important to the river's health in the past and present, then explain what is needed to keep it healthy in the future. Tillman wrote books about the area, *The Chesapeake Watershed, Saving the Places We Love,* which looks back at what it

### **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.<sup>'</sup> *■ 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

took to restore the Patapsco and other areas from overexploitation. His recently released, *The Big Melt*, explores what might happen to the Patapsco Valley and beyond in the near future. Preregistration

### PA public trails forum

requested. Info: patapsco.org.

The Pennsylvania Trails Advisory Committee and the Lancaster Conservancy are presenting a *Public Trails Forum* 8:30–11 a.m. March 16 at Columbia Crossing River Trails Center in Columbia, PA. Share ideas, opportunities and concerns in a facilitated discussion about all things related to trails at this free event. Space is limited, preregistration required. Info: Lydia Martin, 717-392-7891 x215, Imartin@lancasterconservancy.org, lancasterconservancy.org.

### MD Master Naturalist training

The Anacostia Watershed Society is offering *Maryland Master Naturalist* training on Saturdays, 8:30 a.m.–4 p.m., June 1 to Aug. 10th (no class July 6). at the AWS headquarters, in Bladensburg, MD. Participants complete 60 hours of training in natural history topics, tour the Anacostia River by boat and attend field trips to local areas of interest in the watershed. Participants must be at least 18 years old and provide 40 hours of volunteer service with the AWS after completing training. The fee is \$250. The application deadline is March 31. Info: 301-699-6204 or mkoenig@anacostiaws.org.

#### MD Master Naturalist training

The University of Maryland Extension is offering *Maryland Master Naturalist* training 9 a.m. to 3:30 p.m. Mondays, March 18 through May 20 at Oregon Ridge Nature Center in Cockeysville, MD. Participants complete 60 hours 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 only 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.

➢ April issue: March 11➢ May issue: April 11

of hands-on learning in natural history, environmental interpretation and conservation stewardship with expert instructors. Final certification is awarded after 40 hours of volunteer service at Oregon Ridge. The fee is \$250. Get an application at the nature center or visit extension.umd.edu/masternaturalist.

### Watershed Moments workshop

The Carroll County Forest Conservancy District Board invites the public, ages 16 & older (18 & younger w/ adult) to its Spring Thaw Workshop -Watershed Moments, 8 a.m. to 3 p.m. March 23 at Wesley Freedom United Methodist Church in Sykesville, MD. Experts from private, state, federal and local government agencies will present topics covering flood risk management; the Ellicott City floods; stormwater implementation strategies; rain gardens and other homeowner-scale stormwater management techniques; riparian forest buffers; stream health and local trout waters; tree care and pruning for storm resilience; an overview of the USDA Areawide Tick Integrated Pest Management Project; the relationship between bees and trees; choosing the best trees for pollinators and tips on how to protect bees and other pollinators when applying pesticides. Several breaks throughout the day will provide an opportunity for meeting the speakers and visiting exhibitor tables. Morning coffee and pastries, snacks, a hot lunch and workshop materials are included in the registration fee of \$50/individual or \$75/couple. Register at: carrollcountyforestryboard.org by March 15. Info: Donna Davis at 410-848-9290, donnal.davis@maryland.gov.



**BULLETIN** FROM PAGE 35

### **EVENTS / PROGRAMS**

### Paradise Creek Nature Park

Paradise Creek Nature Park in Portsmouth, VA, invites all ages (11 & younger w/adult) to its free *Guided Ranger Walks* 2–3 p.m. March 16 & 30. Learn about native plants and wildlife, as well as signs of winter wildlife. Registration is required. Info: kfish@elizabethriver.org, 757-392-7132.

### Brave the maze at VLM

The Virginia Living Museum invites the public to "brave the maze" at its American Adventure program, which runs through April 21. When settlers landed on Virginia's shores in 1607, little did they know that less than half of them would survive the year. This immersive, role-play adventure - which blends historical accuracy and the complexities of real life and death decisions - challenges visitors to survive the year as one of the original Jamestown colonists. Visitors choose an identity and make a series of life choices for health, wealth, food and morale. All must be maintained to "survive" the exhibit. Survival is based on visitor knowledge and ingenuity as well as the abilities and priorities of the chosen identity. Participants meet live animals that were new to the colonists and learn how to tell if an animal is poisonous, venomous or edible. The exhibit also includes an indoor rock wall and zipline. The program is included with admission: \$20/adults; \$15/ages 3-12. Info: thevlm.org, 757-595-1900.

### Oyster management talk

The University of Maryland's Center for Environmental Science's Horn Point Laboratory invites the public to Oyster-Futures: a Process for Consensus, a presentation by Associate Professor Elizabeth North 5:30-6:30 p.m. March 25 at the Easton Branch of Talbot County Library in Easton. After decades of conflict over the oyster in Maryland, stakeholders in the oyster resources came to consensus through the science-based, facilitated Consensus Solutions process which was tested in the OysterFutures research program. North's talk summarizes the process, science and stakeholders' efforts that led to the package of recommendations for oyster management in the Choptank region. The free presentation is part of Science After Hours with Horn Point Laboratory, which helps to make

the science of the Chesapeake Bay accessible. Register online: usmf.org/ events/41118-science-after-hours. Info: cstarr@umces.edu or 410-221-8408.

### Sea kayaking class

The Chesapeake Paddlers Association is offering SK101-Introduction to Sea Kayaking 8:30 a.m. to 4 p.m. March 31 at Cult Classic Brewery on Kent Island, MD. Experienced sea kayakers will provide presentations on selecting kayaks and paddles; paddling pointers; kayaking gear; kayaking safely; places to paddle; and transporting and storing kayaks. Area kayakers will share personal stories and tips. Boats, paddles and gear will be on display. This event is primarily for new paddlers or those moving up from recreational kayaks to more challenging trips and waterways. The \$30 fee includes a light breakfast, lunch. Preregistration is required: sk101\_2019.eventbee.com. Info: cpakayaker.com.

### Pollinator gardening workshop

The Maryland Agriculture Resource Council is offering a workshop, Gardening for Pollinators, 11 a.m.–2 p.m. March 16 in Cockeysville to help gardeners get started on a pollinator garden. Topics include: stewardship; pollinators & their status; what bees like & need; attracting & observing pollinators; creating pollinator habitat; preparing soil; plant choices for limited space; deer-proof planting; why light exposure is important; mulch secrets; providing water for pollinators; chemicals & the lawn industrial complex; where does your honey come from? Handouts will be provided. This workshop is free, but a \$10 donation to benefit MARC's pollinator plantings is appreciated. RSVP at the ticket link to secure a spot: marylandagriculture.org/about/ pollinator-workshop. Info: 410-887-8973.

### Ladew Topiary Gardens

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

*■ Little Explorers Nature Program:* 10:30–11:30 a.m. or 12:30–1:30 p.m.
 March 19 (*Whatever the Weather /* make
 weather wheels); April 9 (*Morris Mole* / meet an underground storybook character; create a "Morris" to take home). Ages
2–6 w/adult. Nature walks, stories, songs.
 Fees: \$18/child & adult pair; additional
 siblings \$6 each. Fee includes admission
 to the gardens and Nature Walk (April to
 October) and Butterfly House (June 17 to
 Sept. 30).

Selecture Series / The Hidden Cost (Industrial Scars) with J. Henry Fair: 10:30 a.m. March 27. Harvey Ladew's Barn Gallery & Studio. The aerial images by Fair, an environmental activist, at first appear as photographs of abstract shapes and colors. A closer look reveals them to be the detritus of industrial processes. The ethical implication of the photographs will leave viewers pondering the injustice of the human impact on nature. Fee: \$35. For tickets: ladewgardens.com/EDUCA-TION/Adult-Education/Lecture-Series.

Info: ladewgardens.com, 410-557-9570.

#### MD photo contest

The Maryland Department of Natural Resources is accepting entries for its annual photo contest. Winning entries will be posted online, featured in *Maryland Natural Resource* magazine and appear in the 2020 wall calendar.

The contest is open to novice or professional photographers from Maryland or out of state; but only photos taken in Maryland qualify. Entries can include images of fauna, flora, natural phenomena, outdoor recreation, scenic landscapes or weather. Judges will choose a first, second and third place winner for each season; one of the first-prize winners will receive the overall grand prize. The best overall photo receives \$500, a Maryland State Park and Trail Passport, a five-year magazine subscription and five copies of the 2020 calendar. First, second and third place winners also receive prizes. Social media users will select a "fan favorite" via the DNR's Facebook page. Photographers may submit up to three entries for \$10 with additional entries (no limit) at \$3 each until Aug. 31. All photos must be original and unpublished. Info: dnr.maryland.gov/Pages/ photocontest.aspx.

#### Master Gardeners lecture series

Upcoming topics in the Queen Anne's County (MD) Master Gardener Lecture Series include:

*Secontainer Gardening*: 7 p.m. April 4 at Galilee Lutheran Church in Chester.

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Both lectures are free and offer hands-on learning. Info: Rachel Rhodes at 410-758-0166 or rjrhodes@umd.edu.

### MD nursery trees for spring

The Maryland Department of Natural Resources is taking orders for shrubs and trees from the John S. Ayton State Tree Nursery that are ready for the spring 2019 planting season Almost all of the trees and shrubs are native; many are pollinator-friendly. The nursery offers more than 50 conifer and deciduous species, from loblolly pine to river birch. These shrubs and trees are ideal for buffer plantings, soil protection, watershed protection, wildlife habitat or windbreak protection. A minimum order of 25 seedlings per species is required. Info: nursery.dnr.maryland.gov/default.asp.

### Anita Leight Estuary Center

Programs at the Anita C. Leight Estuary Center in Abingdon, MD, include: *Critter Dinner Time*: 10:30 p.m.

March 16. All ages. Watch turtles, fish,

snakes eat while learning about them. Free. No registration.

Tree Talk: 11:30 a.m.−1 p.m. March 16. Ages 10+ Celebrate International Day of Forests with a relaxing hike, craft. Fee: \$5.

SThe Mystery of John Smith's Chesapeake Cross Markers: 1–3 p.m. March 24. Ages 13+ Capt. John Smith, on his 1612 map of the Bay, marked the extent of his explorations with 27 Maltese crosses. Ed Haile and Connie Lapallo, with the Chesapeake Conservancy, are working to pinpoint and mark these locations in today's landscape. They will weave a tale of exploration, geography, cartography. Free; donations welcome.

*SThe Science of Clouds:* 2–3:30 p.m. March 16. Ages 5–10 w/adult. Examine clouds from outward appearance to inner workings. Experiment, cloud-themed treat included. Fee: \$3/child.

*SWater Watch*: 2–3:30 p.m. March 17. Ages 8+ Celebrate World Water Day by evaluating the water quality of Otter Point Creek using the same tools as scientists. Fee: \$3.

Spring Stream Study: 10–11:30 a.m. March 24. Ages 5+ Sample the stream for insects that reveal water quality. Look for salamanders, frogs, crayfish, spring wildflowers. Boots required. Fee: \$3.

*Meet a Critter:* 2:30 p.m. March 24. All ages. Meet a live animal up close, learn what makes it special. Free. No registration.

Scaught on Camera: 10:30 a.m.−12 p.m. March 30. Ages 4+ Learn from wildlife cameras what animals have been lurking in the Bosely woods. To help retrieve the cameras, meet at 10:30 am. at Bosely. For viewing, refreshments only, meet at the Center at 11 am. Fee: \$3.

Wood Duck Canoe: 3–6 p.m. March 30 Ages 8+ Look for wood ducks in the marsh. Fee: \$12.

*Trail Running Series*: 10−11 a.m. March 31. Ages 13+ All skill levels/paces welcome. Enjoy the scenery on a 2-mile out-and-back single track. Free.

Ages 12 & younger must be accompanied by an adult for all programs. 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.

### York County (PA) parks

Upcoming events at York County (PA) parks include:

■ Eastern Penn Mushroomers Club: 10 a.m.–12 p.m. March 16. Nixon Park, Jacobus. Learn about crust fungi, a group of woodland mushrooms found in all seasons, but not given much coverage in field guides. Taste wild mushroom hors d'oeuvres prepared by club members. Free, no registration. Info: epennmushroomers.org.

36



### **BULLETIN** FROM PAGE 36

Searly Amphibians Nature Walk: 2:30–4 p.m. March 17. Nixon Park, Jacobus. Search wetland habitats for signs of early spring amphibian activity, including American toads, spring peepers, wood frogs. Free, no registration.

Spring Bird Migration Walk: 8:30–10:30 a.m. March 24. Rocky Ridge, Oak Timbers Parking Lot, York. Take a 1.2-mile hilly walk to search for early spring migrants. Park in the back corner of Oak Timbers Lot near the power line. Free. Register at 717-428-1961.

Spring Homeschool Day / "My Side of the Mountain": 9 a.m.–12 p.m. or 1–4 p.m. March 26 or 9 a.m.–12 p.m. March 27. Nixon Park, Jacobus. Ages 6–11 (1st–6th grade). Explore themes from Jean Craighead George's book. (Reading the book beforehand recommended.) Edible plant walk, birds of prey, nature journaling. Limited space for students, parent chaperones. Free. Register: 717-428-1961.

*Signs of Spring Walk:* 2:30−4 p.m. March 31. Nixon Park, Jacobus. Ages 6+ Hunt for buds, leaves, flowers, signs of animals coming out of hibernation or returning from migration. Wear hiking boots. Free, no registration.

Solutional Networkshipping: 12:30–1:30
P.m. or 2:30–3:30
P.m. April 7 or April
O. Nixon Park, Jacobus. Ages 5+ (17 &
younger w/adult). Learn to dye eggs using
onion skins, blueberries, coffee. Bring
hard-cooked eggs (no more than 12 per
participant). Wear old clothes. Fee: \$5
per dyer (no fee for helper). Register at
717-428-1961.

Sunset Scramble Bike Ride: 6:30– 8:30 p.m. April 9. Rail Trail, John Rudy Park, East Manchester Township. Cycle 13–15 miles (round trip) on the Heritage Rail Trail. The group sets the pace. Each rider must have a light, helmet, water. Bring money (optional) for a snack. Free. No registration.

#### **Oregon Ridge Nature Center**

Upcoming programs at the Oregon Ridge Nature Center in Cockeysville, MD, include:

Shoots & Letters: 10–11 a.m. March 14 (Animals that Lay Eggs); March 21 (Signs of Spring); March 28 (Frogs); April 4 (Salamanders); April 11 (Aquatic Insects). Ages 3+ Outdoor activities. Fee: \$2/child. No registration.

■ Introduction to Bird-Friendly Gardening: 6–8 p.m. March 13. Adults. Learn how to turn a home, school or workplace into a bird, butterfly paradise. Audubon experts will share tips for gardening with native plants. Free.

Senior Stroll: 10:30 a.m. March 16, April 6. Adults. Take a stroll along the Marble Quarry Loop, a paved, 0.3-mile interpretive trail. Stay for a guided reflection activity. Free.

*SLuck O' the Ridge*: 1−3 p.m. March 16 & 17. Ages 12 & younger. Go on a "green" scavenger hunt. Fee: \$5/child.

SThe Natural History Society of Maryland & Quest for a State Natural History Museum: 7–8:30 p.m. March 18. Adults. Charlie Davis, former chair of the Natural History Society of Maryland's board of trustees, will discuss efforts by the society and others to establish a state natural history museum. The presentation includes some of the society's collections. Free, donations appreciated. No registration.

*Amphibian Walk*: 2–3 p.m. March 19. Ages 10+ Visit the wetlands to listen to calling frogs, toads. Learn about the center's *FrogWatchUSA* monitoring effort. Free.

Spring Night Hike: 6–8 p.m. March 23. Ages 5+ Experience sights and sounds of a spring night. Later, make s'mores around a campfire. Wear shoes appropriate for walking in the woods. Fee: \$5.

*SWalk in the Park:* 11 a.m. March 24. Ages 5+ Easy/moderate one-hour hike. Wear sturdy, closed-toe shoes. Bring a water bottle. Free.

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Search for frogs, newts, salamanders.
March 30 & 31. All ages. Male a craft.
Search for frogs, newts, salamanders.
Meet some amphibians up close. Fee: \$3.

Sookworm Story Time: 11–11:45 a.m. April 5. Toddlers to age 6. Nature story, activity (animal encounter, puppets or craft). Event may include a brief outdoor activity. Free. No registration.

*≅ Animal Fools*: 1–2 p.m. April 6 & 7. Ages 5+ Learn about creature disguises, deceptions. Fee: \$3.

Ages 16 & younger must be accompanied by an adult. Except where noted, preregistration is required for programs and payment must be made within five business days of registration All programs take place rain or shine. Programs are designed for individuals and families, not groups. To arrange a program for a group, contact the park office. Info: info@OregonRidgeNatureCenter.org, 410-887-1815. For disability-related accommodations, call 410-887-5370 or 410-887-5319 (TTD/Deaf), giving as much notice as possible.

#### **Cromwell Valley Park**

Upcoming programs at Cromwell Valley Park's Willow Grove Nature Center in Parkville, MD, include: *■ Plan Bee*: 1–2:30 p.m. March 16. Ages 5+ Learn about bees, including native mason & leafcutter bees. Create a nesting can for your yard. Fee: \$5.

Solution Strategy Full Worm Moon Night Hike & Campfire: 7–8:30 p.m. March 22. Ages 5+ Native people took note of when worms appeared each year. Look for signs of spring, eat s'mortes. Fee: \$5.

■ Blue Bird Box Building: 11:30 a.m.–1:30 p.m. March 23. Ages 8+ Help the Eastern bluebird by building a house to install at home. All tools, materials, instructions provided. Fee: \$20.

Solution States And S

*Selid Walks:* 8–10 a.m. Saturdays, March 30 through May 25. Meet at Willow Grove Farm gravel parking lot.

Sclay Pot Cooking: 1–3 p.m. March 30. Meet at Primitive Technology Laboratory. Ages 10+ Build a fire, cook in clay pots, make a soup from wild plants and animals to share. Free.

Scrambled Eggs: 1–2:30 p.m. March 31. Ages 5–10. Learn about the egg masses in park's ponds. Wear waterproof boots. Fee: \$4.

*Solution* ≈ Natural Dyes: 1–3 p.m. April 6. Ages 5+ Learn to make dyes from plants, animals, minerals. Bring 12 hard-cooked eggs. Fee: \$5.

Solution So

Set Amazing Amphibians! 1–2:30 p.m. April 7. Ages 5+ Join a naturalist to see who is singing, who is laying eggs. Free. Set Children's Garden Club: Meets

Children's Garden Club: Meets about twice a month 9:30–11 a.m. Saturdays, April 13 to Oct. 19 in the Children's Garden. Ages 5 to 13 w/adult. Grow vegetables, flowers, & herbs while exploring the natural world of a garden. Participants play, learn, craft, eat food they grow themselves. Only registered children may attend (no siblings). Fee: \$45 for all of the 2019 sessions. Registration for this program must be done online.

Ages 12 & younger must be accompanied by an adult. Except where noted, preregistration is required for all programs. 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 programs at Eden Mill Nature Center in Pylesville, MD, include: *■ Preschool Nature Series*: 10–11:15 a.m. March 12 (*Beautiful Birds*); March 19 (*Super Soil*); April 9 (*Earth Day Every Day*) April 30 (*Seeds of Life*). Ages 2–5 w/adult. Nature games, story, craft, hike. Fee: \$10 per session.

Scritter Dinner Time: 1–2 p.m. March 16, April 6 & 20. Ages 5+ Learn about, help feed some of the native animals at the center. Free.

Scheric Adult Hiking Series: 1–2 p.m. March 19 (Spring Fever Hike) April 16 (Hiking 101) Ages: 18+ Hiking games, learn about essential items to bring on every hike, look for animals that have come out of hibernation. Fee: \$3 per session.

Schild & Adult Paint Afternoon / Bunny: 3–5 p.m. March 22. Ages 5–10 w/adult. Child & adult each complete a 14"x 18" acrylic painting on canvas with instruction provided throughout event. Fee: \$50 per pair.

*Set Historic Grist Mill Tour*: 10−11 a.m. March 23 & April 27. All ages. Fee: \$3.

■ D.I.Y. Kite Building & Flying: 9:30-10:30 a.m. March 30. Ages 5+ Design, fly a paper kite. Fee: \$5. Preregister by March 16.

Deer Creek - Lifeline of Harford County: 11:30–12:30 p.m. April 2. Ages 6+ Learn how Deer Creek supports natural life and human civilization in Harford County. Spend time in the stream looking for creatures. Fee: \$5.

Solution Nature Homeschool / Take a Hike: 10 a.m.–12 p.m. April 3, 10 & 17. Ages 6–12 (parents do not attend) Fee: \$25 for month. Learn the basics of hiking, compass reading, geocaching. Preregister by March 20.

Solution Storybook Art for Homeschool: 12:30-2:30 p.m. April 3, 10 & 17. Ages 6–12, parents do not attend. Learn about books, illustrators, art techniques such as drawing, painting, collage, crafting/constructing. Fee: \$44 for the month.

Spring Awakening: 10–11 a.m. April 6. Ages 6–13. Search the wetlands for signs of wildlife, craft. Fee: \$3.

■ Educating with Art - Creating Informative Illustration: 12:30–2:30 p.m. April 6, 13 & 20 and May 4, 11 & 18. Ages 18+ (all skill levels welcome). Learn how art can aid in the study of nature. Practice sketching, observation in the field, then use studies to create a final painting that illustrates an ecosystem Technical instruction provided. Bring sketchbooks, field guides. Acrylic painting materials, canvases provided. Fee: \$90.

*Poetry Walk:* 9:30–10:30 a.m. April 13. Ages: 5+ Walk the trails reciting springtime poetry. Free.

Preregistration is required for all programs and closes 24 hours in advance of each program. Weekend program registration closes at noon on the prior Friday. To preregister: edenmillnaturecenter@gmail.com.

## These quizzes cover a lot of ground!



Match the number to its soil fact:

1. Number of soil classifications in the United States.

2. The top 6 inches of an acre of soil contains this many pounds of living matter.

3. Varieties of bacteria in one gram of soil.

4. Number of years it takes to create an inch of topsoil (the organic layer of surface soil which contains most of plants' roots).

5. Gallons of water when 1 inch of rain falls on

1 acre of soil. 6. Percent of water on Earth that is contained in soil. 7. Soil needs this many gallons of water to grow one bushel of corn. 8. Percent of Earth's carbon dioxide emissions sequestered in soil.

01
10
500
4,000
5,000
27,154
20,000
70,000

9. Soil is made up of air, minerals, organic matter and water. Excluding drought or flood conditions, what is the ideal average percentage of each of these components? Air

Which is greater — the number of organisms in a

Minerals Organic matter Water a. 5 percent b. 25 percent c. 25 percent d. 45 percent



Marsh Slug (M. Horsak / Creative Commons Attribution 3.0 Unported)

Soil is home to thousands of organisms, ranging in size from microscopic bacteria to larger animals like the ones listed here. Can you match the animal to its description? Answers are on page 17.

**Belted Kingfisher** Eastern Mole Marsh Slug Mining Bee Tiger Salamander

1. This animal, which spends most of its life underground, is not blind. In fact, its eyes have a thin film that keeps the dirt out when it is tunneling. It uses its claws to tunnel backward and forward with equal ease. Many people think this creature is a garden pest. They forget that the animal is a natural pesticide that eats grubs and other larvae and that its tunnels aerate the soil

2. This creature lives in forests and fields but must take cover underground during hot or dry weather lest it





Mining Bee (U.S. Geological Survey Bee Inventory and Monitoring Lab)

dehydrate. It is a garden pest, feeding on seedlings of many field crops by using a toothy tonguelike structure. It has two pairs of tentacles on its head. The creature's eyes are at the ends of the top two. The lower pair is for tasting and smelling.

3. One could say that this year-round Bay crea-



Right: Tiger Salamander (Gary M. Stolz / U.S. Fish & Wildlife Service)

Below: Eastern Mole (Kenneth Catania. Vanderbilt University / Creative Commons Attribution-Share Alike 3.0 Unported)



ture lives in two worlds. It spends its time in trees or bushes overlooking water, waiting for its prey: fish, crayfish, insects, and small amphibians and mammals. When not in the air, this animal is in its tunnel, dug into the side of a stream bank. The tunnel often slopes slightly uphill, so in the event of high water, any chicks in the nest can get to higher ground to avoid drowning. Unlike many animals, the female is more brightly colored than a male.

4. This creature is the largest and most widespread of its land-dwelling cousins in North America. In the Bay watershed, though, it is only found in parts of Delaware, Maryland and Virginia, and is on the endangered list in each of these states. It lives in damp burrows up to 2 feet below the soil's surface to escape extreme

temperatures above. The best chance to see one is in late winter to early spring when it seeks out breeding ponds.

5. There are more than 1,300 species of this creature in the world. Those in the Chesapeake watershed are known for digging 0.25-inch wide, pencil-like nests in the ground. Many people

fear the nests will harm the soil (they don't) or that the creature will sting them (they are nonaggressive and rarely do). What they are good at is pollinating flowers and orchards. Unlike some of its cousins, who are known for living in communities, this creature lives alone.

— Kathleen A. Gaskell



Belted Kingfisher (U.S. Fish and Wildlife Service)

### *Tricolored herons: Here today, but where tomorrow?*

#### By Mike Burke

Dropping out of the opalescent sky with its neck neatly tucked back, the heron floated into view. Swinging its long legs forward at the last second, the graceful bird landed at the edge of an open pool of water. The blue-gray body stood out against the tawny marsh grasses.

Seeing herons at the Chincoteague National Wildlife Refuge in Virginia is a common occurrence, but this bird was a bit different than most. A sinuous white line ran down the thin throat, eventually spreading into an all-white belly.

It was late March last year, and it seemed too early in the season for this southern visitor. But no other dark heron has that throat stripe and white belly. I saw while the bird was landing, that its underwing linings were white, too. This was a tricolored heron (*Egretta tricolor*).

The bird was a beauty, in full breeding plumage. Standing about 2 feet tall, the tricolor has a 3-foot wingspan. The fleshy area in front of the eyes and the base of the bill were a brilliant turquoise. A few white plumes extended from the back of the head. Wispy chestnut feathers edged the throat line. Mauve patches on the shoulders and back blended seamlessly into the blue-gray body feathers. Its legs were pink, and its eyes red. The sexes look alike.

Tricolors are permanent residents of the Gulf Coast, parts of the Caribbean and Central America, and the coastal marshes of northern South America. Every spring, some fraction of the birds from these regions migrate north to breed.

From April to August, a modest number of these herons breed and raise their young around the Chesapeake, Delaware and inland bays. By September, their numbers will expand as postbreeding birds from farther south come our way to explore and feed on abundant fish. Most will depart by December.

Tricolors are colonial nesters. They usually roost and nest with other species, with the tricolors tending to occupy the periphery of colonies. When they forage, they exhibit similar behavior, hunting alone or on the edge of mixed flocks of wading birds.

Nests are constructed by both parents. The male starts by placing some sticks in a low tree or shrub. Later, he brings sticks to the female for final placement. Both parents incubate the three to-five eggs in the single annual clutch. It takes three weeks for the eggs to hatch and nearly as long again before the chicks fledge.



Juvenile tricolors have a wood brown neck and considerable brown in the body feathers.

After breeding, adults will molt into their "basic" plumage, losing many of their flashy colors. Gone is

the turquoise patch, replaced by yellow. The eyes and legs revert to brown. The mauve highlights in the wings and back are replaced by a more muted lavender. Fortunately, the diagnostic white throat stripe and white belly are retained in all plumages, including juvenile.

Tiny fish make up 90 percent of the tricolor's diet. Occasionally, they eat frogs and insects such as grasshoppers.

Tricolors only feed during daylight. They often wade into deeper waters than their close relatives: the snowy, little blue, and reddish egrets. With its belly nearly touching water, the tricolor holds its coiled neck just above the surface. A lightning strike captures its prey. Like great blue herons,

tricolors sometimes stand motionless, waiting for unsuspecting prey to swim by. At other times, the tricolor's feeding behavior more closely resembles that of the frantic reddish egret. Dashing about, pirouetting and extending one or both wings, the tricolor is a frenzy of activity, stirring up killifish, topminnows and the like.

Normally, seeing an unexpected bird is great fun, but my reaction to seeing the tricolor was decidedly mixed. This bird shouldn't have been there.

In the mid-20th century, ornithologists counted tricolored herons as the second most common long-legged wader in the United





Top: After breeding, adults molt into their "basic" plumage, losing many of their flashy colors. (Keenan Adams) Bottom: This adult is just short of its prime breeding colors, lacking only its turquoise eye patch and pink legs. (Ryan Hagerty) Both photos courtesy of .US. Fish and Wildlife Service)

States (only outnumbered by cattle egret). In 1976, almost three-quarters of the U.S. breeding population was found in Louisiana (hence the bird's old name, Louisiana heron). By the late 1980s, those numbers were plummeting. Wetland loss in the bayou was advancing at an alarming rate, robbing the birds of prime breeding and feeding locations.

Tricolors accelerated their search for new territory, rapidly moving up the Atlantic coast. In Maryland alone, 600 breeding pairs were counted in 2003. But even here, the habitat crunch continues. Isolated islands, prime breeding grounds safe from land-based predators, are being lost everywhere to rising sea levels and devastating storms.

The tricolor I was watching was apparently trying to adapt to a rapidly warming planet. It had arrived earlier and farther north than its ancestors ever did. Silently, I wished the bird well. But I knew full well that birds everywhere are being threatened by the climate crisis. The fossil fuel lobby and its enablers in Washington, DC, are handing tricolors and thousands of other species a life-threatening legacy.

If you love birds, fight for laws and regulations that will slash greenhouse gas pollution. Fight like their lives depend on it. Because they do.

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

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### Look around for signs of the season springing up around the watershed

### By KATHY RESHETILOFF

The first day of spring is March 21, but March can be a fickle month with weather bringing everything from icy winds or snow to downright balmy days.

Depending on the weather patterns, it's often hard to know if spring has arrived, especially if a late winter storm system descends upon the mid-Atlantic. Regardless of whether March comes in like a lion and out like a lamb (or vice versa), you can always be assured that winter is on its way out when you see (or hear) some of my favorite harbingers.

Osprey (Pandion haliaetus) are a spring icon. These birds occur in nearly every corner of the globe, but nowhere as abundantly as on the Chesapeake Bay. Two feet long with wingspans of 4-5 feet, these brown and white birds of prey are easily recognized when in flight, as their long narrow wings look like an outstretched M.

Their abundance around the Chesapeake is due to the availability of food; they feed exclusively on live fish. Curved, sharp talons and rough-soled feet are designed to hold onto slippery



fish. Ospreys hunt by soaring over water, periodically hovering on beating wings as they scan for fish. Upon sight of its prey, An osprey makes a spectacular dive. Folding its wings tightly, it descends swiftly and plunges feet first into the water, often submerging itself completely.

The Chesapeake Bay also provides ospreys with great nesting areas near water such as duck blinds, navigation

markers, or man-made nesting platforms. Offshore structures offer eggs and chicks protection from predators, like raccoons.

Another sign of spring sign can be heard from small pools forming in forests and fields. Known as vernal pools. these small pools fill with water from



The musical trill of the American toad illustrates how beauty also exists in the "ear" of its beholder. (Isaac Chellman / U.S. Geological Survey)

melting snow, rain or underground sources.

Not directly connected to flowing streams and rivers, these pools do not contain fish. Because of the absence of these predators, amphibians like salamanders, frogs and toads use vernal pools to congregate and breed. Vernal pools explode with activity and the sound of

frogs and toads calling for mates.

Wood frogs (Rana sylvatica) are one of the earliest visitors to vernal pools. You can recognize them by their call, a hoarse clacking sound, reminiscent of a quack. The wood frog is an explosive breeder usually laying a large mass of eggs in a few days and leaving soon after.

The spring peeper (Hyla crucifer), a tree frog, follows the wood frog by a week or two. Its unmistakable mating call, the peep, and large geographic range makes the spring peeper one of the most familiar frogs in North America. Its mating call can sometimes be heard up to a half a mile away.

Another familiar spring visitor is the American toad (Bufo americanus). Its habitat ranges from mountains to backyards, where there are moist places, insects to eat and shallow waters to breed. Despite their warty appearance, their mating call is a pleasant musical trill.

Many beautiful wildflowers begin to appear in March. One of the oddest is the Jack-in-the-pulpit (Arisaema triphyllum). Found in woods, bogs, and swamps, the Jack-in-the-pulpit is easily identified by its striped purple and green hood (the pulpit) enveloping a club-shaped spadix (the Jack) of male and female flowers. The spathe on this plant is elegant, vase-shaped and tapering to a delicate point.

Another early bloomer found in forests, thickets and clearings (including yards) is the tiny spring beauty (Claytonia virginica). With five white, white with pink stripes, or pink petals, spring beauty are among the earliest flowers in the pring the landscape. But because of its flower size (0.5-0.75)inches), it is easily missed.

Totally opposite from the spring beauty, are the very showy Virginia bluebells (Mertensia virginica). Despite its name, this flower is found throughout the Chesapeake Bay watershed in moist floodplains. Clusters of large trumpet-shaped flowers start out as pink and turn more blue as the season progresses. The acidity of the soil also influences their color, from white to pink to blue. The higher the acidity in soil, the bluer the flower.

Yellow perch (*Perca flavescens*) make their spawning run from late February to mid-March and offer some of the earliest opportunities for sport fishermen to break out their rods and tackle. Their delicate meat and early arrival makes these fish a favorite.

Striking in appearance, yellow perch are easily recognized by golden yellow and dark vertical bands. Populations of yellow perch are most prevalent in Upper Chesapeake Bay tributaries. These fish spend most of the year in brackish water and migrate to freshwater to spawn. Yellow perch never leave the river system where they hatched, they merely move between brackish and freshwater.

Before setting out, remember to check with your state's natural resource agency for fishing regulations and licenses.

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



The tiny spring beauty is one of the first flowers to color the landscape. (R. Harrison Weigand Maryland Department of Natural Resources)