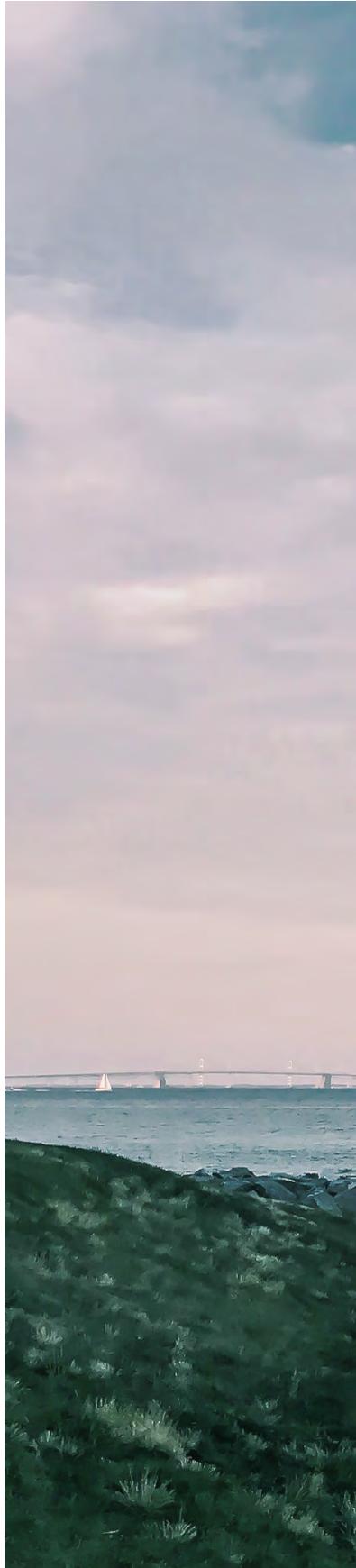


Chesapeake Stories

The Bay in Words and Pictures



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Making a Comeback

Horn Point Laboratory Fuels Oyster Restoration

----Adde Gross, E.J. Mason, Megan Sinclair



Horn Point Laboratory

Photo: Adde Gross

When you think of oysters, you may remember a fancy seafood dinner with Oysters Rockefeller or recall the bivalves' reputation as an aphrodisiac,

Making a Comeback (continued)

but oysters are much more important than that: they support the ecology and the economy of the Chesapeake Bay.

Horn Point Laboratory is located on Maryland's Eastern Shore, in Dorchester County along the Choptank River, a tributary of Chesapeake Bay. Horn Point is located on 800 acres of land and is one of six campuses under the University of Maryland Center for Environmental Science.

The lab is a member of the National Association of Marine Laboratories and one of the largest oyster hatcheries on the East Coast. Since the 90's Horn Point has been playing a key role in the population of oysters in the Chesapeake Bay and the overall health of the Bay.

Importance of Oysters

Oysters are important to the Chesapeake Bay region because they are a keystone species, which is an organism that other species in an ecosystem depend on. If this species was removed from an ecosystem, there would be a negative change in the environment, as oysters are important for filtering out things like algae and nitrogen. An individual oyster can filter about 50 gallons of water a day, which helps to keep the water clean.

Varying salinity levels and pollution are two major factors working against oyster populations. The ideal salinity range for growth and development of oysters is between 10 and 22 parts per thousand (ppt). This means oysters prefer salty water over fresh water.

The Bay's health in general began to decline in the early 1970s. The main contributors included pollution from construction, agriculture, and industry. The higher the pollution level in the Bay the harder the oysters have to work to filter it out. Another obstacle to sustaining a good population of oysters is commercial over-harvesting. Due to these two factors, or as

Stephanie Alexander calls them, "the perfect storm," oysters are no longer self-sustainable in the Bay. Alexander is the Senior Faculty Research Assistant at Horn Point and she is responsible for managing the hatchery and giving tours to the public.



Stephanie Alexander

Photo: Adde Gross

Horn Point's Involvement

Horn Point receives "kids big and small" to participate in tours: middle and high school students and in the off season, groups of retired people, come to visit.

Alexander does 2 to 15 tours during a week, but she tries to share the workload when she can. Staff members tend to get busy during late spring and early fall since this is when they are still producing oysters. The number of people participating on tours tends to slow down in summer, but organizations like the YMCA and the National Aquarium bring kids to summer camps at Horn Point to participate in activities at the laboratory. Alexander really enjoys giving tours because "Oysters are something everyone can understand, and we can bring it

Making a Comeback (continued)

down to their level. Everybody gets oysters, and everybody at heart knows they are important to the Bay." Alexander believes that letting the younger kids really get involved by doing hands-on work with the oysters has really made an impact on their lives. Some have even contacted her years later to telling her that "getting oyster muddy has made them rethink how life is, and they are now going into environmental science field in order to make a change in the environment."

The Process in a Nutshell

Alexander and her team at Horn Point work seven days a week to care for and ensure the growth of their oysters. Horn Point follows the lives of their oysters from start to finish. The process begins in January or February depending on the year. The laboratory receives mature oysters in December when they are in the "hibernation stage", but it takes about two months for the process to really begin. Oysters are easily controlled because of how dependent they are on the water temperature. This "luxury of being able to heat the water up or chill it" allows lab personal to manipulate the oysters' cycle of reproduction to follow the pace they need for proper growth.

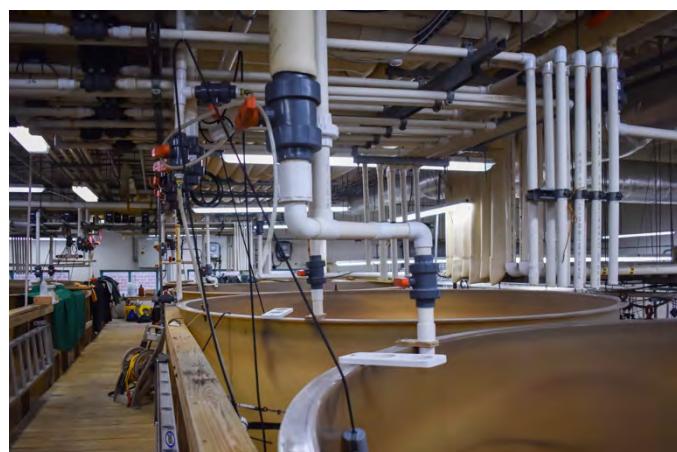
Lab personnel begin the process by gradually "[warming] them up to about springtime temperatures. That wakes them up and they start eating and putting all their energy into reproducing," according to Alexander. It takes a mature oyster about two months to start spawning," so if all goes well we can actually start spawning in March."

This manipulation of the oyster's reproductive cycle is the backbone of the operation. In nature oysters don't start spawning until the summer months. "So, we get a huge head start on what Mother Nature can naturally do," Alexander says, and adds that this manipulation works the other way as well. Once the water gets warm, the oysters are going to spawn. So, if the team isn't ready for them to start spawning yet they

can cool the water down and "delay reproduction until they can control" the operation. These mature oysters act as the "lifeline of the hatchery program... they are kind of the unsung heroes in all of this, she says."

Once the mature oysters have been "warming up" for about two months and are ready to spawn, they get moved to the spawning table. "Oysters are broadcast spawners which means they release everything into the water column." By watching them spawn the team can determine which oysters are male or female. "You can't just look at an oyster and tell if it's a boy or a girl," explains Alexander. "You actually have to watch it spawn." The females "clap" their shell and "spit the eggs out in ... a puff" while the males "release spawn from the side."

Alexander and her team watch the spawning closely so that they can separate the sexes to ensure full control over the reproduction. According to Alexander "if we can't control it, we don't use it because we need to be able to control, especially for fertilization." Once the oysters have been separated they are left to spawn separately for about forty-five minutes then they "combine all the eggs, count them, and fertilize them." Once the larvae are fertilized they get moved to a swimming tank.



Swimming tanks

Photo: Adde Gross

Making a Comeback (continued)

Horn Point has thirteen large swimming tanks that house the larvae while they eat and grow. The larvae get fed four to eight times a day and they are fed a “well-balanced diet” of four to five types of algae. The lab personnel do this so the oysters can “be exposed to a wider range of species.”



Different types of algae

Photo: Adde Gross

Each different algae acts as a version of our food groups. One is fruits and vegetables that are easy to digest. One is heavy in protein, so it acts as the meats and dairy. And lastly there is an algae that is high in fats which acts as the sweets. Each of these algae are given to the larvae at different times in their growing cycle based on what they like and what they can properly digest at that time in their life.

The larvae are kept in these swimming tanks for two to three weeks until they mature. At about two weeks in, the larvae develop a dark spot in

the middle of their shell, which is called an “eyespot.” Next, they develop a “foot” “that kind of looks like they’re sticking their tongue out at you.” This tongue is used to search for a substrate or a secure surface to attach to. Once the tongue is developed, the baby oysters have to be removed from the tank, so they don’t attach themselves to the wall. Once attached to the walls of the tank, they have to be scraped off, which kills them.

The mature larvae get taken out of the swimming tanks and sorted by size. The lab has a series of sieves that they pour the larvae through. With the help of gravity, they are able to sort the larvae by large, medium, and small. Once sorted they analyze them to see eye spots and feet then they get moved down to the setting pier.



Sieves

Photo: Adde Gross

In the setting pier the laboratory has unoccupied oyster shells that the larvae attach to in order to develop safely. In these new tanks the laboratory staff can again adjust the temperature and salinity of the water to ensure the best results. This step usually takes forty-eight hours. “During that time, they will swim around and then glue themselves to all the

Making a Comeback (continued)

shells that we have provided... now they are stuck." Once stuck the larvae are now considered "spat" or baby oysters.

Oysters for Profit

In addition to Horn Point's focus on restoration of the oyster population, they also team up with local farmers to help those who make a living on the Bay continue to do so. According to Alexander, the "aquaculture business is booming right now ... so this year there was a big shift in farmers getting involved." Horn Point does their best to work with and educate the local farmers, so they can mutually succeed. The laboratory holds various "workshops and training programs... so they can come in and see what we're doing, work with us, and learn what to do and what not to do."

Horn Point also sells larvae and spat to local farmers, after helping the farmers determine which way of farming works best for them. There are two traditional ways of farming oysters, on bottom and off bottom.

On bottom is the more haphazard way of farming where "you put spat on shell overboard and you pretty much walk away till they are ready to be harvested," says Alexander. This way requires much less work, but there is no insurance of the quality of that product. On bottom oysters aren't the ones that would be served on the half shell at the raw bar.

Off bottom farming on the other hand is when the oysters are held in a regulated, monitored tank. Farmers that grow off bottom oysters are going for the half shell market which is much more labor intensive, but they are getting paid more money at dockside. This choice comes down to a business decision, and the laboratory is there "to help them make that decision, whatever it might be."

In addition to helping the farmers decide how to farm, Horn Point also advises them about

their options on which type of oyster they can farm. There are three different types: diploid, triploid, and disease resistant.

The diploid are the traditional oysters that will reproduce, so they are not harvested in the summer months to allow them to spawn and promote population levels.

Next are the triploid oysters that cannot reproduce, so they are the ones that most farmers lean toward so they can harvest year-round. The triploid also grow faster because they don't have to focus their energy on reproducing.

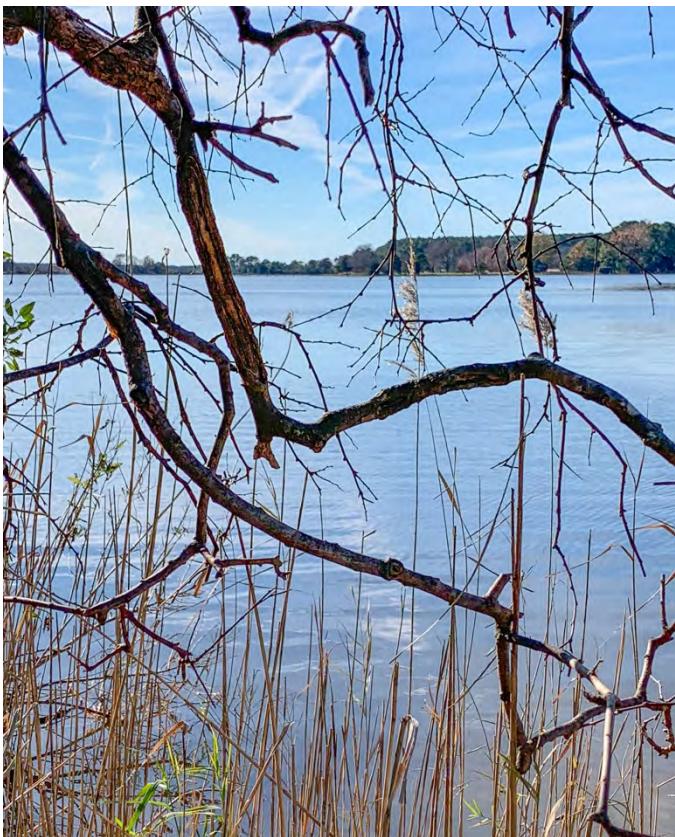
Disease resistant oysters are more tolerant of diseases (but not completely immune) and are less prone to die before harvest, but still under the control of Mother Nature. Whether the farmers chose diploid, triploid, or disease resistant oysters, the team at Horn Point will do everything they can to help each farmer make the best decision for his or her individual situation.

Sanctuaries

The majority of oysters that Horn Point grows are placed in sanctuaries, areas of the Bay designated for ecological restoration where commercial harvesting is prohibited. "Sanctuaries cannot legally be touched," Alexander explains. "They are there for the ecological good, the spawning, the water quality, and the removing of nutrients from the water column."

In a sanctuary such as Harris Creek, Horn Point has put over a billion oysters back into the water, restoring over 450 acres of oyster reef. Alexander says, "Harris Creek is our shining example right now, and you can see the difference. Water quality has improved, nutrients have been reduced, grasses have started to rebound, and the oysters we have put overboard are starting to reproduce so

Making a Comeback (continued)



Harris Creek

Photo: Beth Gross

there are more offspring in the water as well."

Now the chief issue Horn Point faces with restoring the oyster population is making sure commercial fishermen are not illegally catching oysters in these sanctuaries. This is where the Department of Natural Resources (DNR) plays a significant role in their oyster restoration projects.

DNR works with Horn Point on enforcement, regulations, and management of the industry. They have also helped with building the hatchery and the setting pier for Horn Point.

One way that DNR participates in managing the industry is they get to pick the sites for the sanctuaries. Alexander says, "They are a really good partner because they're involved in

everything; we get to work with them on the biological side, but then they are the ones enforcing, managing, and regulating things, so they can use the "science" to do that better."

DNR is scheduled to complete a stock assessment this upcoming December for Horn Point, which will tell them how many oysters are in the Bay. This stock assessment tells them how much effort is needed to harvest the oysters, whether it be by dredging or by hand tongs. Then the DNR can begin determine appropriate measures and regulations on how to harvest. Alexander believes this is necessary "in order to better manage what we have left, which we have not been doing a very good job of."

Getting Involved

Horn Point has other programs that allow for individuals to get involved with helping replenish the oyster population. One of those programs is the Shell Recycling program, where people who eat a lot of oysters or are having an oyster feast can collect the shells to give to Horn Point.

The Oyster Recovery Partnership (ORP) offers this a program with some of the restaurants in cities like Ocean City, Salisbury, and Washington, DC, where they put their oyster shells into a container and ORP will go pick them up and bring them to Horn Point. Alexander explains, "It used to be we had a lot of oyster shells, but now we don't have very many. You might think collecting a 5-pound bushel of oyster shells isn't going to help us, but it does, because shell is very limited. We will take what we can get."

Looking forward

The work Horn Point is doing is not slowing

Making a Comeback (continued)

down anytime soon. In fact, it is predicted to increase over the next decade, as oysters play an important role both economically and ecologically in the state of Maryland. The lab has been extremely busy over the past years, putting millions and millions of oysters back into the Bay. Stephanie Alexander hopes the



Each shell represents a million oyster spat produced by Horn Point Laboratory.

Photo: Adde Gross

oyster aquaculture industry continues to grow in the future and that restoration is still being supported. She says, "Right now it's up in the air--we have put millions of dollars into this,

but will it still be supported in the next 10 years?"

Farmers who are growing their own oysters, still need the hatchery to provide spat. Alexander says, "Farmers can't go to Walmart and pick their stuff off the shelf; it doesn't exist. We are ... the hatchery Walmart for the Chesapeake Bay." Alexander hopes that in the next 10 years the hatchery is still there to fill that role in providing help for farmers who are trying to grow their own oysters.

Replenishing the oyster population is essential if we want to see a healthy Bay in the years to come. Horn Point Hatchery is working to ensure that oyster restoration is taking place in the Bay and also growing oysters to support the demand for the half shell market.

Alexander and her team are working seven days a week to ensure that the oyster population in the Bay is being rejuvenated, not only for the present generation but for the future generations as well. She says, "It's a really cool thing to know that we are working really hard and at the end of the day when we go home exhausted that we have accomplished something: we put 20 million oysters in the Bay. We spawned a billion babies."



View of Choptank River from Horn Point

Photo: Adde Gross

Art Scene Snapshots

Short Takes: Muralist, Photographer, Art Center
----Aubrey Anderson, Cris Nelson, Myia Tariq



Artwork by Jamie Naluai

Photo: Cris Nelson

The Chesapeake Bay region is a paradise for artists, with its ever-changing views, variety of shapes and lines, and abundance of colors.

Inspiration for Bay artists is endless, as they are able to capture the area's wildlife, and landscapes of beaches, grasses, and forests.

This article looks at two artists--a muralist and a photographer in Southern Maryland--and a thriving community art center on the Eastern Shore.

Art Scene Snapshots (continued)

Muralist Jamie Naluai

Jamie Naluai is a painter originally from Pennsylvania. She currently lives in Lexington Park, Maryland where she focuses on painting murals and spreading her talents to other artists. She first got into murals by painting them for friends for free, and loved the feeling of putting beauty on a wall and spreading that joy to others.



Mural Detail

Photo: Cris Nelson

Naluai first took an interest in art in 6th grade where her art teacher taught her that with art, she could love all other subjects in school. Her teacher, Mr. Walton, would bring his artist friends to class to share their experiences.

Once into junior high, she continued with her love of art, signing up for a class filled with all boys. "I remember walking into class and Mr. Standard asking if I was supposed to be here and asking if I had taken the prerequisites for the class. I replied, "Yes I've taken them all."

He then proceeded to say, "Okay take a seat."

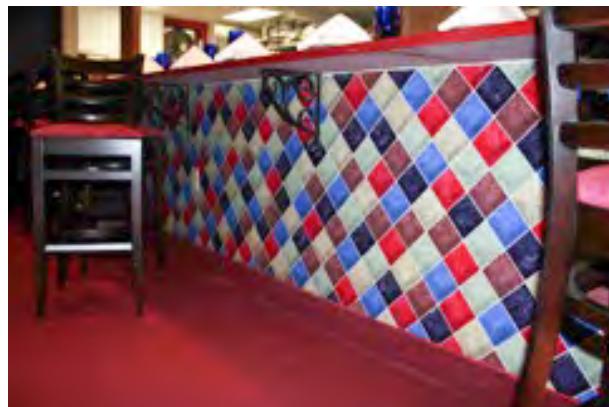
and I became the only girl in an all boy class. Two of those boys became my brothers-in-law later on in life," she says.

When she was a senior in high school she taught art classes after school for a local park & recreation program. Her teacher would allow her to use his art room to teach these kids.

After being told that the only way to make money as an artist would be to teach professionally, Naluai attended Weber State University in Utah to complete her general education classes for an undergraduate degree. She then continued her education at Utah State University where she obtained her associate's degree in teaching.

After college she got married and moved to Brigham Young University with her husband. In order to put him through college – which she says she never regretted – she got a full-time job at the local chamber of commerce, and in her part-time she became a window splasher, going to local businesses to decorate their windows for different occasions such as Christmas or homecoming.

Now Naluai has an art business called "Just Paint Now," where she creates murals and faux finishes. Faux finish is a form of painting where materials such as wood, marble, stone, and ceramic tile are replicated using paint.



Faux tiles

Photo: Just Paint Now

Art Scene Snapshots (continued)

Naluai's portfolio contains a wide array of nature murals that focus on the Chesapeake Bay, the beach, meadows, and related themes. She says "art is all you are. Give all that you are and put it on paper or a wall," and adds that her favorite thing about being an artist is opening herself up to the world, difficult though that may be at times.

She says she has put at least 1000 hours overall into her art and still finds it difficult to consider herself a professional artist. "There is always something else to learn," she explains.

Currently, she is teaching art at a senior center,

where she says she is constantly learning new skills in order to better teach the senior citizens that come in.

Her next big project is being unveiled this week in Leonardtown, Maryland. She entered a bid in early March and won a \$10,000 grant from the local arts council. With this money she was asked to paint the new mural in the downtown Leonardtown area that will showcase Leonardtown from old to new. She was very excited about this project as it brought new challenges and new skills for her to learn.



Leonardtown Waterfront

Photo: Cris Nelson



Mural Detail

Photo: Cris Nelson

Art Scene Snapshots (continued)

Photographer Paige Nelson

Paige Nelson started out as a local artist in the Southern Maryland area, on the journey of trying to start her own photography business. Her shoots included landscapes, weddings, and engagement photos on the water and other scenic sites around the area.



Paige Nelson Photo courtesy of Paige Nelson

Nelson first got interested in photography one afternoon while sitting at home bored, when she decided to pick up an old, cheap camera her parents had lying around. She went out to her back yard and started to play around with the camera, and after seeing what she captured and the beauty behind it she developed a large passion for the art of photography. She didn't know she wanted to do this every day for the rest of her life until she went to college a couple of years later.

She attended the Idaho campus of Brigham Young University with the vision of becoming an organismic biologist who surveys a diversity of plants and animals, but after dissecting lab, she realized the smell and the process wasn't for her, so she decided to test out her hobby as her new vision of her future.

Nelson embarked on a major in integrated studio art with an emphasis in photography. One of her favorite classes was a Film Photography class, where she had the opportunity to use film for the first time instead of digital. Using film taught her to be more mindful of her composition while taking photos.

Also while in college, she had the chance to go to Yellowstone to practice landscape photography.

Once she graduated, Nelson moved back to Southern Maryland and decided the best way to show her talents off was through local photos and recommendations by word of mouth. "My biggest inspiration was my love for nature," she says, "but I started to love taking photos of people because every shot was going to be different, since everybody has different personalities."

She has taken advantage of every opportunity when it comes to sharing her talent with the world and practicing her techniques. "If I could tell up and coming photographers anything, it be to practice, practice, practice as much as possible and continue to learn new techniques and styles to broaden your abilities with a camera," she says.



From a family photoshoot

Photo: Paige Nelson

Even though she loves the work, she struggles with a lack of confidence before every photo shoot because of the immense pressure put on

Art Scene Snapshots (continued)

a photographer during these shoots. "When shooting a wedding, or any photo shoot with people, you have one shot to get the perfect picture or capture a magical moment," she says, noting that she struggles occasionally to keep up with the work, because she doesn't feel she has reached her full potential, and opening up a whole new business is "beyond intimidating."

She is interested in eventually taking business classes and learning the business aspect of photography so that one day she can accomplish her dream of having something she can call her own. "My favorite part of being a photographer is the feeling I get knowing I am creating something unique, Nelson says. "There is no other feeling in the world like it."

Dorchester Center for the Arts

About 17 years ago, the Dorchester Center for the Arts opened with the help of grants, in a building in downtown Cambridge, Maryland that was originally a furniture store in the 1880's.



Dorchester Center for the Arts

Photo: Aubrey Anderson

Robert Gladney, an instructor at DCA, describes the Center as "a non-profit organization that is open to all local artists, both non-professional and professional," and adds that the organization is looking to expand its range to promote the performing arts, music, and crafts such as pottery, weaving, and glass making.

Participating artists come from surrounding

areas, and Gladney says the Center aims to reach out farther, to places like Ocean City, Centreville, and Delaware, in order to foster "interaction with [all the regional art groups] to get a dialogue going among them to support one another."

DCA's mission is to "enrich Maryland's Eastern Shore community through high quality, engaging programming in visual, literary, musical, and performing arts." With this mission in mind, instructors teach a wide variety of classes, including, for example, "Decoy Carving for All," "Mini Mozart" music class, "Absolute Beginners Acrylic Painting," and "Photo Transfer on Wood."

With over 80 classes, people of all ages are invited to practice crafts and art disciplines. DCA provides some interesting materials for the artworks, such as paper for earrings, repurposed wood for bowls, and other recycled materials.

In addition to the classes and shows, DCA has partnered with other organizations in the community to expand their services. One such current program in partnership with the Board of Education brings all of the art teachers in the Dorchester County Public Schools together to show them all the different types of work done at the Center.

Art Scene Snapshots (continued)

DCA also reaches out to the colleges and universities in the area, such as Salisbury University, and Chesapeake College.

Each month the exhibits at the DCA change, featuring in December the work of a group called "Wednesday Morning Artists," and a "Gallery of Gifts." January's exhibit will showcase artwork by DCA members.

Gladney describes the Center as a place where artists can "come in and have studio time," meet other artists, and participate in groups devoted to arts like photography, writing, crafting, and painting. He believes the formation of these groups can start an "artistic movement" to express the wide variety of artforms in the Chesapeake Bay region.



DCA's Gallery of Gifts

Photo: Aubrey Anderson

Chesapeake Invasion

Non-Native Species Threaten Regional Ecosystems

----Megan Brady, Nick Kramer, Seth Leve



Blackwater Wildlife Refuge

Photo: Megan Brady

Chesapeake Bay is one of the world's largest estuaries, home to many significant species that have provided food and careers to local people for generations. An increasing concern for scientists and stakeholders of the region is the threat posed by damaging invasive species.

Chesapeake Invasion (continued)

These are any non-native plant, vertebrate or fish species that thrive in the environment and ultimately damage its overall health and that of the other species inhabiting the area.

There are more than 200 known invasive or non-native species that inhabit the Chesapeake Bay region and the surrounding watershed. While most of these populations pose little to no impact on the health of the aquatic ecosystem, others have the capability of entirely reshaping it.

Currently, three of the most threatening invasives are Phragmites, Nutria, and Snakehead fish.

Pernicious Plant

Phragmites is a reed-like plant that was accidentally brought to the area by ships arriving from overseas in the 1800's. Due to its ability to thrive in wetland habitats, and its resilient and adaptive nature, Phragmites has been able to infiltrate large areas of the Chesapeake shoreline.



Phragmites in the Blackwater Refuge Photo: Megan Brady

While providing little to no nutritional value for wildlife or contribution to the ecosystem, non-native Phragmites often hinders native plant species' ability to continue growing, including the region's own native species of

Phragmites. The similarity in habitat requirements of the native and the invasive Phragmites is one factor that has given the invasive plant the ability to take over extensive areas the way it has.

Dr. Tami Ransom, an Environmental Studies professor at Salisbury University, said, "There's no way they are going to get rid of it," in reference to the efforts made by Maryland's Department of Natural Resources to eradicate the damaging plant population.

Despite substantial efforts in attempting to slow the spread of this invasive, very few of the methods carried out have shown to be effective. As a result of this difficulty, Ransom said that the DNR is only able to act defensively in an effort of "maintenance," meaning all they can do is cut back what they can and hope it does not continue to spread.

The issue with this strategy, according to Dr. Ransom, is that if the Phragmites continues spreading, we may see other native plant populations wiped out because there is not enough space left for them to thrive and grow.

The Blackwater National Wildlife Refuge, which is managed as part of the Chesapeake Marshlands, has seen the damage Phragmites can cause. The Refuge is very diverse and is home to a number of invasive species that have caused issues in the area.

The people working at this refuge have implemented many projects to protect the area against this harmful species and help other areas all around the Chesapeake. Staff member Michele Whitback explained how invasive this species is in the area and how most people mistake the native Phragmites for the invasive kind. She cited statistical evidence to show how invasive this species truly is: "Phragmites occupies as much as one third of the tidal wetlands along the eastern United States coast," and added that. "since Phragmites is everywhere we really have to

Chesapeake Invasion (continued)

prioritize." What she means by this is that the first step is looking at the areas that the Phragmites is newly moving into and trying to chemically treat them.

Within the Wildlife refuge they use fire to neutralize the dead material, and in the fall they spray the invasive Phragmites to kill it. "People all around the Chesapeake are working to control this species but realize it is so widespread that prioritizing the areas is the only thing happening as of now", said Whitback.

Furry Foe

Another non-native species that has caused significant damage in the Chesapeake region is the Nutria. Nutria are large, rat-like mammals that were originally brought over from South America. Nutria have a yellowish-brown colored fur, and were highly sought after when



Nutria

Photo: Chesapeakebay.net

clothing made from fur was popular. When the fur trade collapsed during World War II, many of the Nutria either escaped or were released into Chesapeake-area wetlands. Because of their high rate of reproduction, the population exploded, and scientists soon realized that the Nutria were destroying wetlands.

The reason the Nutria caused so much harm is that, unlike the native muskrat, they eat the native plants all the way down to the roots, leaving nothing left for the plants to rebound, which ends up causing the wetlands to erode and flood out.

Whitback explained how Nutria were extremely common in the area along the Bay in the late 1990s. In 2002 the Chesapeake Bay Nutria project started on Blackwater Wildlife Refuge, and then expanded across the whole Delmarva Peninsula. "It has been over three years since we have seen any nutria on the Refuge" Whitback said, "but we still go through all the watershed in the area to make sure we have eradicated them." The goal by the end of 2020 is to make sure they have eliminated this invasive species from the whole Delmarva Peninsula.

Outside of Blackwater, the DNR has been working to eradicate the population of Nutria since the mid 1900's. Starting with trappers, who were not very effective, they moved on to a project called Judas Nutria, where they attached trackers to the trapped nutria and use them as a device to find other nutria.

The Judas Nutria method has proven to be very effective and has helped rid most of the Chesapeake Bay region of all Nutria. Nutria eradication has been one of the few success stories with ridding the area of invasive species.

But even though the Judas Nutria program was very effective, some people have had thoughts about whether or not it was ethically

Chesapeake Invasion (continued)

sound. According to SU Environmental Studies professor Dr. James Hatley, the Nutria eradication program could have unintended implications.

Hatley believes that it was for the good of the environment that the Nutria were eradicated, but poses the question of how wiping out the Nutria has affected our outlook on other species. We see Nutria in a bad light because they have been so harmful to the Chesapeake Bay environment, but Hatley says, "if that leads us to see it [the Nutria] as a pestilence, that's dangerous." He believes that society needs to understand that Nutria, like other species considered invasive, do have a place in the world somewhere, and deserve to be respected for that.

Aquatic Invasive

It seems as though the minute one devastating invasive is relatively under control, another comes into play. The Chesapeake Bay region is most widely known for its seafood industry. The region also exhibits an abundance of resources and considerable biodiversity in the rivers and ponds scattered around the landscape. But lately there have been reports of major *declines* in the biodiversity of fish populations of many of these waterways, which some people attribute to a new invasive species, the snakehead fish.

Snakeheads were originally brought over from Asia as aquarium fish or because they are considered a culinary delicacy. In the wild, they were first discovered in a pond in Crofton, Maryland in 2002.

The problem became apparent when people realized that snakeheads will eat everything, including all of the other fish in the ponds. They breed quickly, spread easily, and have been taking over rivers and ponds since their introduction.

Nate Leve, an avid outdoorsmen in Dorchester

County, has seen first-hand the impacts of the snakeheads. "If you're fishing in south Dorchester nowadays you better be ready to hook into a snakehead. It's almost inevitable these days," he said. Leve has spent a lot of time fishing for bass, perch, catfish and rockfish, and stated that he feels like the populations of those native fish are taking a major hit. Leve said, "Snakeheads will eat everything in sight... and once everything is wiped out, they'll eat each other."



Snakehead caught in Salisbury

Photo: Kyle McIvor

Nick Letts, an officer of the Maryland DNR, gave a similar pessimistic understanding of what is able to be done about this population of ravaging fish. "There isn't much information

Chesapeake Invasion (continued)

on what measures can be taken to eradicate this growing population," Letts said, and explained that the main initiative by DNR up to this point has been to encourage local anglers to kill and report any and all snakeheads that are caught in the region.

Due to the wide range of climates and conditions that Snakeheads are able to thrive in, their expansion could one day threaten all the coasts and waterways of North America.

Hope for the Future?

Although this story has focused on only three of Maryland's most invasive species, there are many more out there threatening our coastal region. Although some threats, like the Nutria, have been successfully beaten back, Michele Whitback warns that "invasive species will always be an issue, and those that inflict great damage on regional ecosystems are *"a huge issue."*



Blackwater Wildlife Refuge

Photo: Megan Brady

High-Tech Organic Farming

An Alternative to Industrial Agriculture

----Sean Phillips, Sarah Tenner, Courtney Williams.



Organic Hydroponic Lettuce

Photo: Courtney Williams

Maria Payan was never happy with city life. She owned a business in Baltimore, but when she was about to have her first child, she knew that she wanted return to her rural roots in Pennsylvania. She thought she was lucky when she found a two-acre property where she could continue her business online. Her cabin was located in a welcoming community. Her family was close to nature. It was supposed to be an

High-Tech Organic (continued)

idyllic life, one where her children would be raised in a healthy outdoor lifestyle.

But her dream came to an end when the property across the street from hers was sold. Soon her rural cabin was across the road from three massive industrialized chicken houses.



Industrial poultry houses

Photo: USDA

"The smells were unbelievable," she says, and recounted that she was calling 911 because of the severity of the odors. Her situation only worsened when the smells suddenly became stronger and fouler.

She would later learn that the farm had had a mass mortality event. Some 20,000 birds died when the generator in one of the chicken houses lost power.

And the smell wasn't the only thing affecting her and her family. Soon rashes appeared on her eight-year-old son's body after he took baths. The water from their well was being contaminated by water rushing down from the farm uphill during severe rain and storms.

When her husband was diagnosed with cancer, she knew she could no longer live where her family's health was at risk.

According to Payan this is not a rare occurrence. The industrialization of our food supply has greatly increased the number of people that we can feed but has had adverse effects on both human health and resources

like Chesapeake Bay. Some people are questioning the future of agriculture and looking into ways we can feed our population in a healthier way.

Payan thinks the key to a safer agriculture involves changing the system. She believes that the system in which the United States mass produces meat through the use of concentrated animal feeding operations (CAFO's) is creating environmental problems, adverse health effects and promoting vast social inequalities.

An area in the Bay region famous for its use of CAFO's is the Delmarva Peninsula, long known for its poultry production. According to Delmarva Poultry Industry Inc., in 2017 they raised 605 million chickens and produced 3.4 billion dollars in value, part of what Payan calls "a global system, in which larger corporations are benefiting from externalizing their costs." Corporations are responsible for costs such as inputs, employment, and factory upkeep, but they are not currently held responsible for the costs to society through health issues and pollution. Payan claims if they were, the businesses wouldn't be profitable.



Inside a chicken house

Photo: USDA

High-Tech Organic (continued)

She further claims that poultry houses pose a risk to water resources. According to the Environmental Protection Agency (EPA) the amount of nitrogen and phosphorus in the Chesapeake Bay has increased to excessive levels in the last few decades. This eutrophication (excess nutrients in the water) has been caused by run-off from various sources, but largely from agriculture.

Eutrophication can cause both hypoxia (oxygen depletion in water) and harmful algal blooms. The EPA says that these harmful effects have led to the decline in species such as submerged bay grasses, blue crabs and oysters.



According to Payan, there is a correlation between living near CAFO's and reports of conditions like asthma and cancer. Asthma

may be aggravated by the air pollution produced from chicken houses. Health problems can also originate from agricultural water pollution. Nutrient pollution in water is harmful even at low levels. The EPA warns that infants are particularly vulnerable to nitrates in the water. Wells can easily become contaminated on the Delmarva Peninsula because the region has a high water table and sandy soil which makes it easy to transport pollutants to the aquifer.

In Salisbury, Maryland, an underground aquifer called the Paleo Channel provides water for the city and is very sensitive. Payan believes that any poultry houses situated over the Paleo Channel could be dangerous. The Paleo aquifer is close to the surface and has a high risk of being polluted.

Thirteen chicken houses were proposed above the aquifer on Naylor Mill Road. A community group that Payan is a member of, called Concerned Citizens Against CAFOS, fought against the houses and ultimately succeeded in getting the project stopped.

According to Payan, industrial agriculture affects animal rights, property values, health, and the environment. She says all these concerns should lead to more citizen action. She believes that industrialized chicken should be monitored, and science should influence the policies. She thinks that "science has become politicized" and that local politicians are ignoring sound science in favor of larger industries' lobbying.

Payan works with Socially Responsible Agriculture and Concerned Citizens Against CAFOS to rally communities together. To protect the future of agriculture in the Bay region she believes that people must address the harm that CAFOS are producing and work through community groups to demand change.

High-Tech Organic (continued)

One individual in the Chesapeake Bay region who is experimenting with the future of agriculture is local organic farmer Andy Holloway. Andy is the son of Robert and Virginia Holloway, who bought the 79 acres of land that was originally intended to be used for the thirteen commercial chicken houses on Naylor Mill Road.

Tyson Foods Corporation had a farmer-contractor who planned to use this land in order to expand production, but in the midst of the controversy, the Holloways stepped in to purchase the land as a way to grow their business.

Andy is a sixth-generation organic farmer, and his farm is located in western Wicomico County, near Hebron. The Holloways grow all of their crops without the use of pesticides, and they use seeds that have not been genetically modified, otherwise known as non-GMO.



Andy Holloway

Photo: Courtney Williams

The family business, Baywater Farms, consists of a half-acre hydroponic organic greenhouse and twenty-four acres of field crops.

The Holloways first opened the greenhouse in 2011, and they expanded it in 2013. Andy says that they are currently working on another expansion by adding another shelf level above

the existing layer.

Since the Holloways established Baywater Farms, their produce has become increasingly popular, and demand continues to stay on the rise. "This next installation should be able to help us keep up with our customers", says Andy, "and increase our output by 33%."

Growing, harvesting, packaging, and shipping all happens at the farm. The goods get shipped almost all over Maryland, but the majority of them go to Jessup and Baltimore. The most popular orders and requests are fresh herbs and lettuces.



Ready to ship

Photo: Courtney Williams

Baywater Farms practices what is known as hydroponic gardening, which is a process where crops are able to develop and grow without the use of soil. Either the roots of the crop are suspended in a nutrient solution, or the solution is misted over the crops as often as necessary.

The plants and their nutrient levels are monitored by computers that can detect exactly what each plant needs to ensure it receives the proper amount and balance of these elements. The solution is distributed through an assembly of pipes, and the tables

High-Tech Organic (continued)

sit slightly slanted in order to be able to recollect the solution and recycled.



Computerized feeding

Photo: Courtney Williams

their food even gets to the grocery store".

Andy likes to focus on encouraging farming smarter and more sustainably, but he also believes and understands that accessibility can be an issue, so he feels local markets should be more encouraged and utilized. However, he realizes that feeding the world population the way that they farm is nearly impossible.

"As much as I believe in what we do, I don't believe that it is sustainable for the world's population" he says, "The economy will just not allow for it." He suggests that local education is vital for being able to make more conscious decisions toward consumption and agricultural practices.



Hydroponic growing trays

Photo: Courtney Williams

The Holloways have friends and neighbors that own chicken houses. One family in particular has been chicken farming for three generations. "I'm in a bit of a predicament, you see. I have neighbors that are friends, and they have chicken houses," Andy says. "I'm not going to tell my neighbors that they can't have the chicken houses."

Holloway says the future of agriculture is going to be complex. Although he strongly supports the idea of organic farming and the practice of buying locally, he understands that it can be "a double-edged sword."

The Holloways understand some of the harmful effects of today's industrialized agriculture and recognize that their farm, and farming itself, is much different today because of the change in agricultural technology. They are especially aware of the environmental impacts, so they make it their goal to prioritize quality over quantity.

Andy says the Naylor Mill property purchase was important not only for their company expansion, but also to preserve the health of this land and water. When people like Payan started to protest, social groups formed, and Andy says he took advantage of the community backlash to the chicken house proposal. "I was just lucky," he says, "to be in the right place at the right time".

The Holloway family has been advocating for the "Farm to Table" movement since Andy's great grandfather built the farm in 1950. This movement supports the idea of supporting local farming and consumption by arranging farmers to connect directly to consumers.

Andy claims that buying locally comes with many benefits, and he believes many people have become disconnected with understanding how their food gets to their plate. Andy says that "consumers are usually unaware of how

Fishing for Fish

(Not Just Crabs)

---Julianna Boller, Corey Gwin, Samantha Pope



Pound Net

Photo: Samantha Pope

Around 10,000 years ago, glaciers began to melt and flooded the Susquehanna River Valley, resulting in the formation of the Chesapeake Bay. Today, the Bay is North America's largest estuary and the third largest in the world. The Bay itself is about 200 miles long, stretching from Havre de

Fishing for Fish (continued)

Grace, Maryland all the way to Virginia Beach, Virginia. This body of water shapes the state of Maryland and covers approximately 4,480 square miles.

When people think of harvesting seafood on the Chesapeake, they typically think about crabbing, but the Bay also contains diverse and valuable fish species, and fishing for *fish*, whether it's done for recreation or commercially, is a tremendously important activity on Bay waters.

Recreational Fishing

On and around the Bay, many people participate in recreational fishing. Shane Hall is one of these people. Hall is an Environmental Studies professor at Salisbury University and participates in recreational fishing on the Bay often. There are many different ways people can fish and it just depends on the fishers' preferences, he says. Hall participates in all types of fishing, using spin, fly, and bait casting tackle, and likes to find shallow marsh areas to throw his line.



Shane Hall

Photo: Salisbury University

not catch anything, because that is not fun for them. Ideally they want to be able to go out on the waters and reel in fish after fish. Hall explained that fishing is all about interacting with the environment. He said the Bay is an "alien world or a different world and can only be accessed by fishing."

The most successful fishers know how to make the right decisions and how to "get the bite." This takes knowledge and experience because fisherman need to know the water and the environment that they are around. Most fisherman have a certain "spot" that they rely on and go to because they know the area well and have experience with that water.

Recreational fisherman like to keep their secret spot to themselves usually. Janes Island State Park, located in Crisfield, Maryland is one of Hall's favorite spots to escape to and go fishing.



Janes Island pier

Photo: Maryland DNR

Recreational fishing can also be a way to socialize with others. Many fishermen like to go out on the boat with friends and family and enjoy the waters together. Fishing is an activity that anyone can participate in, which is one of the reasons it is very popular around the Bay.

Hall just recently moved to the Eastern Shore, so as of now, he doesn't have many fishing friends around the Bay area. However, he mentioned how recently one of his West Coast friends visited him and they went fishing together. His friend caught a Striped Bass

Fisherman typically do not like to go out and

Fishing for Fish (continued)

(Rockfish), which is a very common fish in the Bay area, but his friend was ecstatic to see this fish since he has never caught one before.

Although recreational fishing is known for its pleasure, it also has significant benefits to our environment and economy. A study was done in 2004 by the Virginia Institute of Marine Science about the economic impact of commercial and recreational fishing. They found that fishing contributed to \$1.23 billion in sales, \$717 million in income, and more than 13,000 jobs in the Bay area, with two-thirds of the impact from recreational fishing.

Many fishermen who participate in recreational fishing are aware of the RFA, which stands for the Recreational Fishing Alliance. The mission of this organization is “to safeguard the rights of saltwater anglers, protect marine, bait and tackle industry jobs and ensure long-term sustainability of U.S. saltwater fisheries.” This is the only political action organization established to represent the rights of recreational fishermen and the recreational fishing industry. Overall, the RFA is there to ensure the long-term sustainability of our nation’s fisheries.

Commercial Fishing--Virginia

The Chesapeake's furthest south point is where the Virginia Beach area begins. This area is filled with summertime tourists as well as full-time residents. This southern end of the Chesapeake offers a lot of opportunity for both small-scale commercial fishing, and a large-scale industrial fishing industry. Some fishers earn their individual livings on the water, while others work for big industry.

One man who formerly fished on the Bay is Sonny Gwin. Currently Gwin owns his own boat, the Skilligalee, and catches lobster out of Ocean City, Maryland.

Gwin initially followed his father's footsteps by working in a shipyard, until he was introduced to commercial fishing by a

neighbor. Gwin immediately quit his shipyard



Sonny Gwin

Photo: Corey Gwin

job and went to fishing full time. The very first boat that he began fishing on, the Jenny Scott, is now located in Crisfield, Maryland. This vessel now is mainly used for crabbing and has a new new owner. Gwin's fishing career began



F/V Jenny Scott

Photo: Corey Gwin

in Lynn Haven VA., but he has also fished out of Reedville Va. doing different types of fishing ranging from gill, seine, and pound netting to pot fishing.

His stories show just how good the

Fishing for Fish (continued)

fishing was when he first started: "The guy I was fishing with told me to shut off the engine. It was still pitch black outside and all you could hear was the trout in the water croaking and making noise. We knew we were going to have a good day."

This is how Gwin quickly became hooked to this newly acquired job. The target species for those trips were Bunker, Menhaden, Alewives, and Porgy. There were multiple days that the fishing was so good that the fish were piled up to the gunwales of the boat.



A good catch



Photos: Tom Smith

The Menhaden species that Gwin used to target is now an important catch for the fish oil industry. Menhaden are vital to the Chesapeake, and also to humans, for their oily consistency. This industrial fishing business has taken over the fishing grounds that Gwin used to fish, in both Lynn Haven and Reedville.

Reedville, where Gwin used to fish, is home to a large processing plant for these Menhaden, where the fish are processed into omega-3 fatty acid pills. This processing plant is run and owned by Omega Protein, an international corporation that supplies nutritional foods, supplements, and animal

feeds around the world. This location in Virginia is the first site for Omega Protein, dating back to 1878.

Omega Protein owns and runs huge commercial fishing boats that set out to catch mass amount of these fish at a time. The big boats carry two smaller boats that are used to actually net the fish via haul seining. One end of the net attached to each boat. The boats then tow the net through the school of Menhaden.

The net then tightens into a giant sack, filled with the fish. The fish are then taken to the larger boat for processing.

Bill Shaw, a local resident of the Lynnhaven Virginia area, said, "Driving over the Bay Bridge Tunnel you can see these larger vessels going through the process. It's pretty cool to watch if you get the opportunity."

Menhaden's importance to the Chesapeake is not only their economic benefits from fishing, but also their contribution to the ecosystem (which means that overfishing them could lead to big problems). Menhaden are prey to other species like Striped Bass and Bluefish. These species depend on the Menhaden as a food source.

And Menhaden also filter feed on phytoplankton and algae, organisms which can be harmful to the Bay in high concentrations. Controlling their populations is especially important to the coastal areas of the Bay and estuaries.

Commercial Fishing--Maryland

There is no physical boundary separating the Virginia and Maryland parts of the Bay, but the Virginia end of the Bay is different from Maryland in that it is saltier, which means it can be home to a different fish community. However, there are similar techniques utilized by fisherman in both states. Fyke nets have

Fishing for Fish (continued)

been common throughout the Bay since the area was occupied by Native Americans because they are successful in catching various types of fish.



Fyke net

Photo: Duluth Nets

More recently there have been fewer fykes in tributaries of the Bay on the Eastern Shore. Tommy Calloway, however, (front cover photo) has been fishing fyke and pound nets since the 80s with the influence of his uncle and grandfather who had been fishing the same waters long before him.

Calloway fishes the Nanticoke River, a tributary of the Bay. At the time when he started "it seemed like a lot more people used fyke and anchored gill nets," but you don't see many in the Nanticoke anymore besides his. He sets their nets different than fisherman in the Bay would consider, that the shoreline of the Nanticoke has a more gradual incline. But they follow a concept, "started by the Indians" where a net comes out from the shore, generally 100-300 feet, so that fish will trail on either side and then you'll have an opening that leads into the throat of the long hoop net



Pulling in a fyke net

Photo: Samantha Pope

that funnels and keeps the fish inside.

Calloway is the only local fisherman who uses 5-6 feet long fykes; normally they're only 2-2 1/2 feet long.

The pound nets that he uses "follow a similar concept," except there is more net that leads from shore, generally 500-700 feet, and that leads into a 12-foot-tall throat that bottles the fish into the pocket of the pound net. The pound net is generally in "14 feet of water, while the fyke is in 5-8 feet" according to Calloway. This net is also a different concept than the fyke because it is "open" while the fyke net is enclosed. As you can see in the photos at the beginning and end of this article, the top of the pound net is open at the surface of the water so one side can be untied and pulled into the boat, and then the fish can be dumped out and sorted.

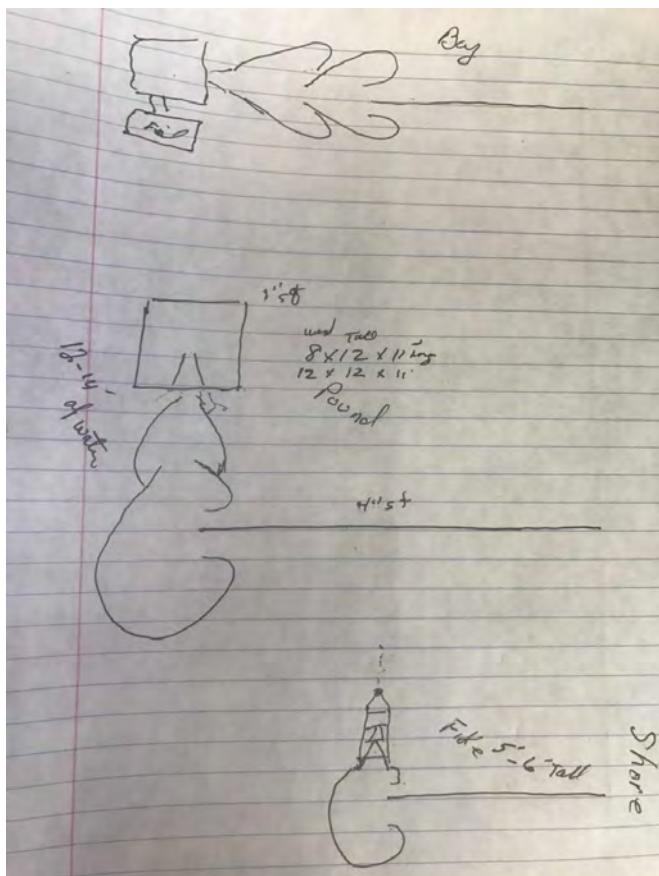
Typically, Calloway catches a lot of Perch, Catfish, and Rockfish in the right seasons. He can recall catching a couple of "odd" things, including butter fish, sturgeon, and even a couple of seals. He remembers someone from the DNR calling and telling him that he might catch a sturgeon based on the tagging system they used. The second time they went fishing after that call they caught not one but two sturgeons and haven't caught any since.

The seals, caught in different years, were collected and studied by the Department of Natural Resources. But Calloway said he "never found out much more about why they were up in the Nanticoke." He considers unpredictability a big part of fishing for a living, because you never know how much you're going to catch or when, but it's not too often he catches something that really surprises him like that.

To a boater passing by it may look like an odd configuration of nets, but this type of fishing and the specific design has been passed down to Calloway. "Each fisherman adopts their own pattern and configuration," he says, "so

Fishing for Fish (continued)

they all can be a little different" he said. But for Calloway and his family, they buy net of different sizes or "stretch" that they cut, shape, and build into the pattern that they have made their own. The photo below shows Tommy Calloway's sketch of different net configurations used by his family:



Sketch of net types

Photo: Samantha Pope

hundred yards in either direction it could change how much you catch." This type of knowledge of where to fish and how to do so comes with the years of experience Calloway has under his belt.

Before he started using pound and fyke nets, his family drift netted, but that doesn't "work as well" with their farming. Currently, they can set nets in February, fish until June, take up the nets, then ideally put them back down in October and fish until December. This system fits better with their harvesting and planting seasons.

With drift netting on the other hand "you have to be ready to go when the fish are here, and you spend more time out there drifting." Using pound and fyke nets allows him to go out and fish for a couple hours every other day, and then "when you're not there they're still catching fish."

Calloway has been involved with marine biologists from DNR throughout the time he has been fishing. During the season they come out and survey their catch looking at different species and keeping track of lengths, males and females, and they take some to check age.

Professor Tom Horton of Salisbury University also sends out one or two students from his class each year to ride along with Calloway to experience the fishing process and local culture, and learn more about local species.

At one time the Calloways didn't have to buy nets because Tommy's grandfather "sewed his own netting, but you can't find many people that do that today." Taking what his grandfather and his uncle have passed down to him, he has created his own patterns and ways to set nets.

Times have changed, but where Calloway has fished hasn't. Even though the shoreline has changed and receded, he said they "set basically the same all the time. You can't just set a net, [because] if you even move a net one



Skiff on the Nanticoke Photo: Samantha Pope

Fishing for Fish (continued)

"Bringing people in to study and learn about what we do is our way of getting involved and helping the Bay" Calloway says.

Fishermen are facing challenges in and around the Bay. They have to "modify" how they fish because "so much of the marsh is gone." Sea level rise and receding marsh is changing the available waters for people like Calloway, to fish. Throughout his time fishing he has seen how the shorelines have changed in his local tributaries of the Bay. Some places have only "6-inch-deep water 150 feet away

from shore," and other places, where "a Jon boat would hit mud in the 70's," have become the deepest rivers.

The Bay will continue to change like it has done for thousands of years, but this abrupt change could become more problematic with more severe storms and hurricanes. Calloway said, "As someone who works on the water and enjoys it on their down time, I hope the changes the Bay is experiencing won't keep watermen and recreationalists from passing these practices down to the next generation."



Pound net catch

Photo: Samantha Pope

Staff



Photo: Jaime Bunting

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