Auburn on the Coast

A Fisheries Extension Newsletter

Volume 2 (1)
Spring 2024

In this issue:

Andrea M. Tarnecki, Ph.D.
Assistant Extension Professor
atarnecki@auburn.edu

Melissa Partyka, Ph.D.
Assistant Extension Professor
m.partyka@auburn.edu

P.J. Waters, Ph.D.
Associate Extension Professor
waterph@auburn.edu

AU SHELLFISH LAB

AUBURN
FISHERIES, AQUACULTURE AND AQUATIC SCIENCES

extension
ALABAMA A&M & AUBURN UNIVERSITIES

Oyster Gardening on the Gulf Coast

Emily McCay

The 2023 Mississippi Oyster Gardening season kicked off as oysters were distributed across the coast in late September. One month into the season, the oysters are doing very well. Low rainfall over the past few months has led to high salinity on the coast, creating optimal conditions for oyster growth. Oysters will remain under the care of the gardeners until May next year, after which they will be picked up and planted onto oyster reefs.

In August, oysters were spawned at the Auburn University Shellfish Lab and set onto bagged, seasoned-recycled oyster shell. This "spat-set shell" was transferred to holding tanks in the Dauphin Island Sea Lab (DISL) mesocosm and later picked up by program staff for distribution. The Mississippi Department of Marine Resources provided help delivering oysters to all sites, shortening the time oysters spent out of the water and in transit. Gardeners will routinely shake their gardens once a week to clear oysters of mud and debris. They are also responsible for removing any predators that may have gotten into their cages, such as large blue crabs and oyster drills.

A bag of spat-set shell ready for delivery to an oyster gardening site.

This year, Oyster Gardening programs are partnered with DISL researchers in a study to investigate the impacts of predator cues on oysters. Previous studies observed that oysters exposed to elements found within blue crab urine produce stronger, thicker shells. Oyster gardeners received two marked sets of oysters.

Continued Page 2

Oyster Gardening Continued

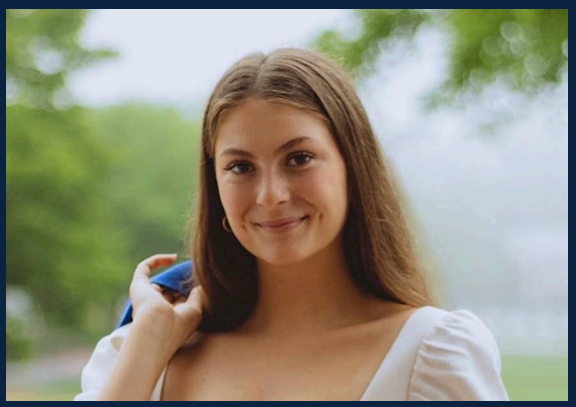
One set is a control group (marked with green cable ties) and the other is the treatment group (marked with yellow cable ties). Both sets grew an additional thirty days in the mesocosm with the treatment group exposed to blue crabs isolated from both the oysters and one another. The gardeners will keep these two sets separated from each other in marked oyster gardens. Data collected during the season will be analyzed to determine if any differences in growth and survival exist and what, if any significance this variability represents.

Anyone interested in joining the program can visit our website at oystergardening.org or contact us directly at oystergardening@auburn.edu. Mississippi Oyster Gardening is funded by the AL-MS Sea Grant Consortium and permitted and supported by the Mississippi Department of Marine Resources.

Auburn staff place clean, bagged oyster shell into settling tanks in preparation for setting with oyster larvae, or spat.

Meet Our Scientists: Grace Valentine

Grace Valentine is a new Research Assistant with Auburn University's Marine Extension and Research Center. Grace graduated from the University of Delaware in 2022 with a Bachelor of Science in Marine Biology. She will be working on an upcoming project addressing near shore pollution via in situ nutrient sinks in Alabama. (for more information, see the article in this issue!)



Along with her career interests in coastal ecology, Grace enjoys running, reading, and scuba diving!

Dense Spawning Aggregates

Conrad Horst

The third growing season for the dense spawning aggregates project is underway. Oysters from the second growing season were removed from their cages and planted at predetermined locations in August. New spat set shell, spawned at the Auburn University Shellfish Lab, were stocked into cages in September. This season will continue to evaluate the effectiveness of growing restoration oysters in a high stocking density, off-bottom setting. Data from previous growing seasons continues to show up to a seven-fold increase in capacity when compared to a typical oyster gardening location.

Research assistant Conrad Horst stocks spat set shell into cages for the danse spawning aggregate project. Each year, spat set shell are stocked into baskets to monitor growth and spawning condition throughout the year.

In looking at the variation between the two different site locations, the site north of Fort Morgan receives a far greater amount of wave energy than the other site location. In winter, strong North winds can push the whole fetch of Mobile Bay towards the site. These high intensity wind events can last for several days in a row and can cause larger and more frequent waves than what we typically see throughout the year. While this has certainly created some challenges and damaged gear, it allows us to find flaws in the design and the materials used. Understanding these limitations and creating solutions to overcome this high energy problem will be useful when selecting new site locations in the future.

This year will feature some additional upgrades to the gear at the high energy location in an effort to overcome these negative impacts from the additional energy in the winter.

In addition to the improvements of the gear, we are excited that our water quality monitoring system will undergo installation again soon. Having this system in place allowed for real time monitoring of water quality with measurements taken every 15 minutes. Last year, lightning struck the piling that housed all the gear, destroying the electronics and rendering our water quality monitoring system useless.

Continued Page 4

Spawning Aggregates Continued

After many months of waiting for new parts, we anticipate that the installation will begin in the next couple of weeks. Having this monitoring system back up and running will allow us to better understand some of the water quality conditions that our oysters are growing in.
Overall, the dense spawning aggregates project continues to show promise as a method for growing oysters for restoration purposes.

We will continue to monitor our oyster drill exclusion methods and their effectiveness across both sites in an effort to reduce mortality due to predation.

Finally, we look forward to seeing what impact the modifications to the gear will have on this year's growing season.

Meet Our Scientists: Luke Matvey

Luke graduated with a B.S. in Marine Sciences from Eckerd College and is now pursuing a M.Sc. at the Auburn University Shellfish Lab. He is working with Dr. Andrea Tarnecki in the microbiology lab where he is leading studies on bird interactions with floating oyster aquaculture gear. His research aims to define the risks of seabirds to raw oyster consumption and provide insight into the effectiveness of bird deterrent strategies (for more information, see the article in this issue!). Luke is scheduled to graduate in the Summer of 2024, after which he plans to pursue a Ph.D.

Birds And Floating Oyster Aquaculture Gear

Andrea M. Tarnecki

Off-bottom oyster aquaculture involves growing oysters at the sea surface as opposed to on the seafloor where natural oyster reefs are located. For off-bottom aquaculture operations, oysters are placed into gear that suspends the animals just below the water's surface. This technique has a few advantages as compared to traditional on-bottom culture. The oysters are protected from predators such as oyster drills, a snail that can bore into the oyster shell and eat the animal. Additionally, they are protected from sedimentation which can lead to suffocation. The surface waters are rich in algae and the suspended oysters have access to abundant food. This gear provides opportunities for culture techniques which improve growth, survival, and appearance, including the ability to remove biofouling and control stocking densities. However, the floating gear also acts as an attractant for seabirds.

As seabirds roost on floating aquaculture gear, they may defecate on the cages or into the water surrounding the growing oysters. There is concern that this may transfer potential human pathogens from the birds to the oysters, which may cause illness when consumed raw or undercooked.

Few foodborne illnesses resulting from the consumption of raw oysters have been directly linked to birds; however, to increase confidence in seafood safety and reduce the number of bird interactions with oyster gear, farms are required to have an operational plan that includes their protocol for deterring birds or mitigating their impacts on the oysters.

Since the summer of 2023, the Auburn University Shellfish Lab has been monitoring bird interactions with floating oyster cages. The most common visitors include pelicans, cormorants, and a variety of tern species. When zip ties were attached to oyster cages, acting as ticklers to prevent birds from landing on the gear, there has been an 80% decrease in bird interactions, indicating this inexpensive deterrent can be very effective. It should be noted that the deterrent may be more efficient at preventing some bird species from landing than others, and therefore its usefulness may be site specific and dependent on the bird population at a particular farm.

Continued Page 7

Birds And Floating Oyster Continued

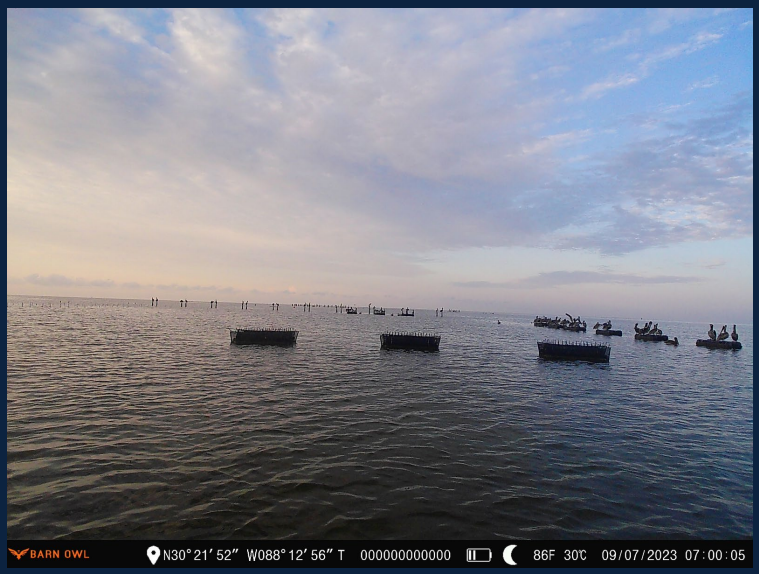


Figure captions: Top, birds landing on floating oyster aquaculture gear. Bottom, lack of birds on gear with zip tie deterrents.

Since the summer of 2023, the Auburn University Shellfish Lab has been monitoring bird interactions with floating oyster cages. The most common visitors include pelicans, cormorants, and a variety of tern species. When zip ties were attached to oyster cages, acting as ticklers to prevent birds from landing on the gear, there has been an 80% decrease in bird interactions, indicating this inexpensive deterrent can be very effective. It should be noted that the deterrent may be more efficient at preventing some bird species from landing than others, and therefore its usefulness may be site specific and dependent on the bird population at a particular farm.

This project also involves monitoring bird excrement and oyster tissue for a group of potentially pathogenic bacteria. Data collection will conclude in April 2024 and results will be shared after the study ends. It is our goal to determine the birds that roost on floating oyster aquaculture gear, understand their potential influence on seafood safety, and provide oyster farmers with non-lethal deterrent methods to prevent these interactions.

AUSL webpage

Andrea M. Tarnecki, Ph.D.
atarnecki@auburn.edu
Rusty Grice
rtg0010@auburn.edu

New Programming Seafood Safety

Andrea M. Tarnecki

Recent funding from NOAA Saltonstall-Kennedy will put seafood safety testing in farmers' hands. A simple, fast test for enumerating abundances of human pathogenic bacterial species has been developed that will allow for farm-level testing, so oyster growers have a better understanding of how their farming techniques impact pathogen levels in their oysters.

Participating farmers will receive all the necessary tools, equipment, and training necessary and will work with researchers at the Auburn University Shellfish Lab to use these tests on their farms. It is the goal that expanded use of these tests will make bacterial testing proactive, reducing the number of seafood-borne illnesses in the United States.

New Project: Little Lagoon Oyster Restoration Expansion

P.J. Waters

This project will establish an oyster park as well as up to 12 oyster 'nests' in Little Lagoon. We will employ both oyster farming strategies as well as lessons learned in the successful Oyster Gardening programming to expand oyster restoration efforts within this important water body located in south Baldwin County between the Gulf of Mexico and Mobile Bay. This project is one element of a larger effort led by the City of Gulf Shores to improve the water quality of Little Lagoon and is anticipated to run for five years. In addition to growing oysters for their ecosystem services to the lagoon, the project will collect water quality data in an effort to determine how public health agencies would perceive Little Lagoon relative to shellfish activities.

While additional factors are considered in classification of water bodies,
the water quality component this study will consider is a significant component of that determination.
The results of this study will provide residents of the community with a better understanding of the current status of their environment.

An oyster nest capable of holding thousands of adult oysters that provide ecosystem services and generate larvae while being protected from predators.

Addressing Near Shore Pollution Via In Situ Nutrient Sinks in Alabama

Grace Valentine

Wastewater pollution is a prominent issue affecting cities located downstream from Mobile and Theodore, Alabama, which rank in the 96th and 98th percentile, respectively, for wastewater discharge. Wastewater pollution can impact water quality, harm plants and animals, and present risks to human health. Oyster reefs have the potential to be a valuable asset in the battle against wastewater pollution.

Through the process of filter feeding, oysters take in large volumes of water from their surroundings, extracting particulate matter and nutrients as the water filters through their gills. Because of this ability to sequester nutrients, specifically nitrogen and phosphorus, which are the abundant nutrients found in wastewater, oysters act as natural nutrient sinks. Given this natural super-power, oyster reefs may reduce the level of pollutants in coastal environments. To fill a gap in the understanding of juvenile oysters' contribution to pollution reduction we, in partnership with Kevin Wang's Lab, have launched the Addressing Near Shore Pollution Via In Situ Nutrient Sinks in Alabama project funded by the Environmental Protection Agency. This project aims to evaluate the variation in the efficiency of restored oyster reefs to address wastewater pollution across a variety of oyster sizes, from seed to adult, throughout the nearshore region of Coden, Alabama. The restored oyster reefs on the sites will be monitored and sampled quarterly to determine whether restorative elements including oyster size, bottom conditioning, and/or set style function independently or in combination in the oysters' ability to sequester nitrogen and phosphorus.

The results of this study will help us better understand the most effective combination of restorative elements to maximize wastewater pollution reduction in restored oyster reef environments. Additionally, the results of this study will be transferable throughout the Gulf of Mexico region as a resource for determining best management practices and guiding future restorative efforts to reduce the impact of wastewater pollution.

Water quality corner—Monitoring the impacts of storms on oyster growing waters

Missy Partyka

Every spring we South-Alabamians celebrate the return of warm weather well before our less-fortunate neighbors to the North. Basking in the scent of the first spring blooms as we move from the frigid winter mornings to temperate afternoons, just begging for backyard parties filled with seafood. But spring can come with its own challenges, particularly as our warm southern breezes collide with the still-frigid air to the north, sparking lines of thunderstorms and the potential for riverine floods. All that water might be welcomed in our yards after last year's extensive drought, but it can wreak havoc on our oyster farming community as they watch the weather reports and brace for potential regulatory closures. And close they have—twice now since the end of January—to protect public health from potential pathogens carried in flood waters by the rivers at the top of Mobile Bay.

While the state (ADPH) uses guidelines set forth by the Food and Drug Administration, through the National Shellfish Sanitation Program, to determine the conditions for growing waters to be both closed and subsequently re-opened, there is some room for these rules to evolve. For example, one condition is the height of the Mobile River up at Barry Steam Plant. Several years ago, oyster farmers from Ft. Morgan disagreed with the ADPH's use of the same river stage criteria for closing their farms as the other side of the Bay.

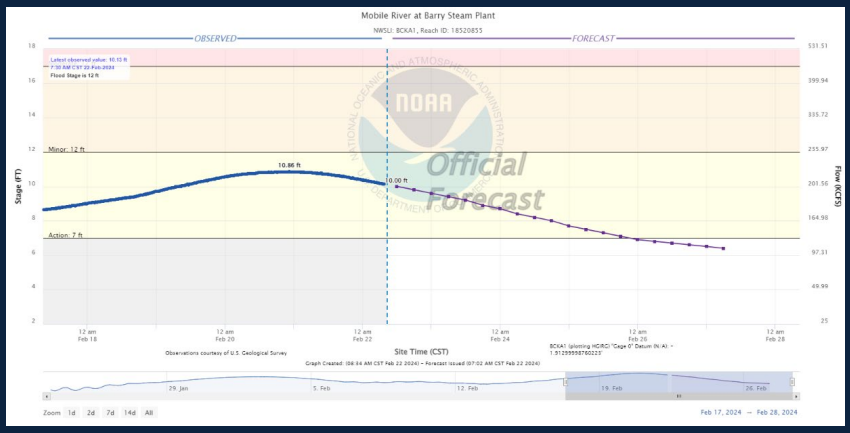
Project partners Missy Partyka (Auburn) and Ronny Bond (UC Davis) conducting round-the-clock sampling during a multi-day rain event this January

So, over the course of three years the growers worked with ADPH as they analyzed additional water samples for fecal coliform bacteria (the regulatory standard for growing waters) with the hopes that the data would support a change in the criteria. And it worked! The data proved that the growing waters on the eastern side of the Bay were safe to harvest up until the river crested 12', a big difference from the 8' closure threshold on the other side of the Bay. In this way, research and data analyses can be used to improve regulatory programs by reducing the impacts of closures on farmers while maintaining public health.

Continued Page 11

Water Quality Corner Continued

For the past 15 months my research team has been conducting water quality sampling around the Bay for a similar purpose—to help refine the current regulations based on data. This spring we will be conducting a series of wet-weather studies to not only monitor the changing conditions in oyster growing waters, but to see if there are other environmental predictors (beyond river stage) that can let us know when growing waters might be unsafe for harvest. The first of these intensive studies took place over those stormy days in the middle of the carnival season in January. The hope is that, in combination with the regular monitoring being conducted by both our group and the state, we can create updated models that are less burdensome to growers but are still protective of our community. I look forward to sharing our updates as this project comes to a close next fall.



The Mobile River crested over 10’ at the Barry Steam Plant gauge last week triggering a closure for oyster farmers on the west side of Mobile Bay. Growing waters cannot re-open until the river falls back below 8’ and water samples show that bacteria levels are back to pre-flood levels.