Project Oyster Pensacola

By Emily Hotinger

Project Organized By Bream Fishermen Association

History

Survival of oysters in Pensacola Bay has been a challenge in the past and present. However, populations are beginning to bounce back. With the help of Project Oyster Pensacola, goals are being set to help the bay thrive again.

Project

Barbara Albrecht organized Project Oyster Pensacola in conjunction with citizen volunteers to see what waters oysters can thrive in and also to see if oysters can have an impact on the water quality in the bay systems.

Community

This project couldn't have been completed without the help of the community volunteers. Citizens of the Pensacola area came together and offered up their docks and water accesses to provide a safe place for the oysters to grow.

Could citizens of Pensacola make a difference by deploying 75 oysters in cages off their docks in many of Pensacola's and Perdido's bayous and bays?

Oysters play a vital role in Pensacola's waterways and shorelines, by keeping the water clean, helping to prevent shoreline erosion, and being a good indicator for water quality. The biggest threats to our waters are sedimentation, storm water runoff, nutrient runoff, pesticides, and unconstrained development in low-lying areas. This is where oysters can come in and help conquer some of these issues. These invertebrates can filter up to fifty gallons of water per day, making them effective at helping to control harmful runoff and help prevent algal blooms. Deploying oyster cages at a variety of locations allows to see the relationships among water quality, oysters and other organisms to ensure a more healthy and stable future for our waterways.

History

Why Pensacola?

Industry boomed in Pensacola after WWII, but that wasn't ideal for the natural environment. Discharge and runoff from factories increased nutrient and contaminant levels in the bay. This built up over time until the mid-70s when massive oyster die-offs occurred, leaving the water quality and economy of Pensacola in shambles. In recent years, however, the oyster industry is making a comeback. The waters have cleared and oysters are once again growing and being harvested in the bay.

What Happened?

The downfall of the oysters in Pensacola Bay all began in 1967. A fungal parasite known as *Labyrinthomyxa marinum* invaded the bay and killed all sorts of marine life, including oysters.[1] The pathogen soon passed, but its mark was left. In September of 1971, fisherman reported large numbers of dead oysters found on the bottom of Escambia Bay. It turns out *Labyrinthomyxa marinum* had returned with a vengeance. This wasn't the only issue, though. Declining salinity in the bay led to weak connective tissues in oysters and their death.[2] This event contributed to additional declines in water quality and took years to recover. The cause of this event had more human impacts than previously thought.

What can we do?

After this horrific event occurred, more restrictions and monitoring were put into place in the 1970s that we still follow today. Fecal coliform levels are the best indicator to see if the oysters can be safely harvested. Monitoring this as well as salinity and water temperatures have led to safer harvesting of oysters and higher rates of oyster growth.

Photo via Florida Memory, Murphy 1969 Pensacola Bay

The Shifting of Pensacola Bay:

Ever since the first map of Pensacola was curated, the bay systems have changed extensively due to currents shifting the sediments of the beaches. Due to the deep water of the Gulf, the waves and currents bring in sediments that, over time, build up coastal shorelines. [5] Because the tidal range in the Gulf of Mexico is low, estuaries and bays have the chance to be built up and create ecosystems. It is in these communities where oysters thrive and grow. Gentle waves that wash over the bays and estuaries contribute to more sediment deposition. This also leads to differing salinities and higher nutrients that create a prime ecosystem for organisms to grow. [5] Refer to page 2 of this article to see how the Pensacola Bay Systems have shifted over time and have created the prime environment for oysters to grow.

Pensacola Bay Systems

Pensacola Bay, Santa Rosa Sound

1787

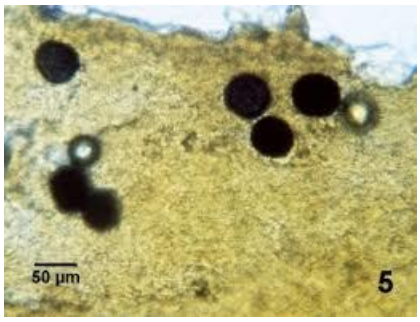
Pensacola Bay, Santa Rosa Sound

1864

Pensacola Bay, Santa Rosa Sound

1975

Why it Happened



Labyrinthomyxa marina under a microscope

Image via *Fisheries and Oceans Canada*

On a normal September morning in 1971, fisherman set out to obtain their daily quota. What they found instead was the end of an era. Scores of dead oysters were being dredged up on the bottom of Escambia Bay practically overnight. These organisms affect the host's tissues by degrading and eventually killing them. [2] This epizootic event was unusually rapid, killing 90% of the oysters in two days. [2] This outbreak of *L. marina* was most likely brought on by an unusually hot and dry summer. Salinities peaked at 29 ppt. These factors along with transport by currents led to the infection of this fungal pathogen. [2]

Generally, all forms of marine life in Escambia Bay by late summer of 1971 were in danger. Organisms such as amphipods, isopods, shrimps and crabs (all indicators of a healthy environment) were missing. Instead they were replaced by excessive growth of blue-green algae, creating a eutrophic environment. [4] This indicates that perhaps *L. marina* wasn't the only factor in the die off. The cause of such algal blooms is due to human pollution through run off by industrial and domestic wastes.[2] High rains prior to the die off event caused higher levels of runoff and a change in phytoplankton density. All these factors are what eventually led to the massive marine die off.

Image via Eve Edelheit Tampa Bay Times

Following this tragic event, it was estimated that the oysters would take between 2-4 years to grow back, and this was only if the water quality improved.[2] Oyster gametes and larval stages are particularly susceptible to poor water quality. This event effectively wrecked the local industry at the time, and plans were made to improve the water quality in Escambia Bay to prevent further oyster kill events. [1] The 1972 Clean Water Act and establishment of the EPA was critically important in improving water quality. In the present day, we monitor to ensure safer waters and seafood, such as monitoring for *Vibrio vulnificus* (really? Thought it was just fecal) and only harvesting oysters when salinities are high. Since this horrific event, the oyster industry has returned and is doing well through the Pensacola Bay Oyster Company, but caution still needs to be taken to ensure an event like this doesn't occur again.

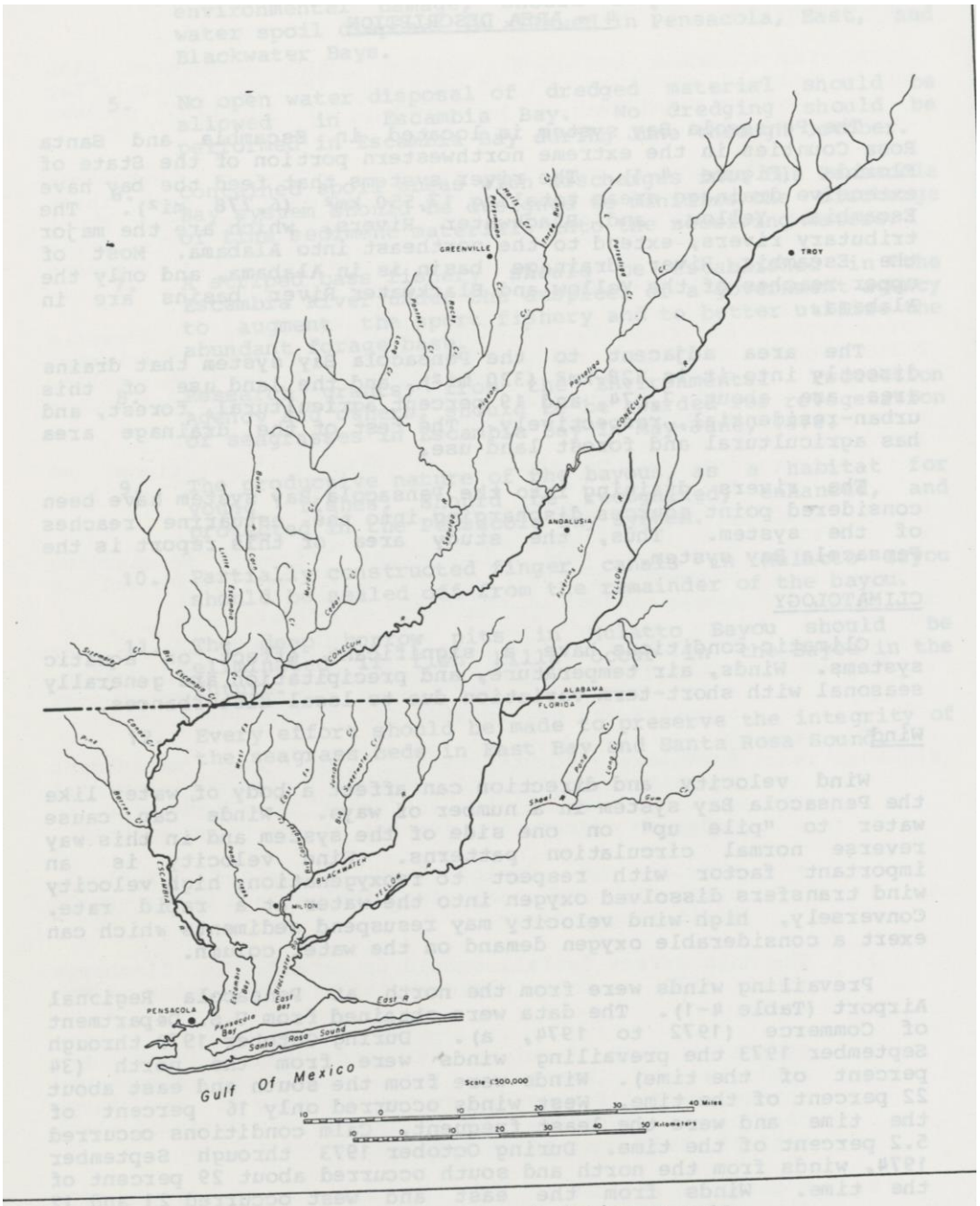


Figure 4-1. Map of drainage area.

4-2

The Effect Runoff Really Has

From the image above [2] you can see the immense waterways flowing directly into the Pensacola Bay System. People in Alabama might not realize that what they are currently doing to their yards and farms will eventually make its way into the Gulf. Even a small stream will eventually connect to a river whose path will lead to bigger waters. This is a hard issue to solve, but continue reading into the next section to see how a recent project is beginning to tackle this issue one oyster at a time.

The Project

Photography by Emily Hotinger

An Overview

Project Oyster Pensacola began two years ago in August of 2017. Donnie McMahon, founder of the Pensacola Bay Oyster Company, began harvesting his first oysters around this time on Magnolia Bluffs. Unfortunately, due to high rain events leading to low salinity and high runoff, most of the oysters died. This large die-off led to an opportunity for the Beam Fishermen Association to create Project Oyster Pensacola. The aim of the project was to see how productive our waters could be if we reintroduced oysters to different areas in Pensacola's extensive bay system.

The eastern oyster, or *Crassostrea virginica*, is a unique organism because it provides habitat for a multitude of organisms. The oysters are a hard substrate that makes suitable habitats for small creatures such as tubeworms and amphipods. Once these small organisms colonize on the oysters, this draws in bigger fauna such as crabs and fish. All these species create a new ecosystem, with oysters at the base. Thus, Project Oyster was designed to see if these ecosystems could be successfully re-established in our waters. Oysters are also efficient at removing and retaining contaminants and sediments from waterways. Another goal of this project was to see if deploying oyster cages at different locations would help to improve the water quality in that area.

This project was conducted with the help of citizens across Pensacola and Perdido Bays. Volunteers came forward to allow use of their dock space to deploy oyster cages. Over the course of the past 16 months, these oyster cages have been monitored and the water quality in the area checked at each sampling trip. The use of citizens allows the community to get involved in something that will benefit the overall health of our waters.

The Community

Barbara Albrecht, the organizer of the project, is seen here monitoring the growth of oysters. She is head of the Bream Fishermen's Association as well as being the Coastal Communities Coordinator of the University of West Florida Askew Institute for Multidisciplinary Studies.

Seen here are volunteers of the project. Many are local citizens who are interested and want to get involved or students of local or statewide universities. These volunteers get to gain hands on experience with the oysters as well as learn about the unique ecosystem that surrounds them.

This is Carole Tebay. She is one of the local citizens who volunteered her dock space for the oyster cage. At almost every visit, she is out with a smile on her face excited to see the status of the project. It is locals like Carole that allow projects like this to happen.

How It Was Done

Sampling for this project took place every three months over the past 16 months. In the beginning of the project, oyster cages were assembled. Triploid oyster spat were supplied by the Pensacola Bay Oyster Company, a new aquaculture venture. Baby oysters and cages were picked up by the citizen volunteers' and brought to their docks where they were submerged in the water so oysters could begin to grow.

When sampling began, students and citizen volunteers visited the 25 sites throughout the Pensacola and Perdido Bay systems to collect water quality data, determine oyster survival and measure and weigh growth rates (10 oysters from each batch were measured and weighed). Growth rates were tracked over eighteen months and compared to the different water bodies. In addition, recruitment of organisms, such as amphipods, mussels, crabs and shrimp onto the oysters and cages was recorded. At the end, the cages were broken down to determine the final numbers of organisms colonizing the oysters and cages. Measurements were also taken to compare the difference in water quality from the beginning to the end of the research period. The triploid oysters will then be donated to be a part of the living shoreline to help prevent coastal erosion or can provide additional research about area waters.

Fun Facts

Did you know an oyster can filter up to 1.3 gallons of water per hour?

Oysters feed by filtering water through their gills to consume plankton. In this process, certain nutrients that can be harmful to other organisms can be filtered out and retained within the oyster. [6]

Did you know wild oyster spat prefers to grow on other oysters than to any other substance?

Oysters need to attach to a hard substrate in order to grow, but attaching to a surface that is like their own is preferable. This leads to the development of oyster reefs that can help to protect shorelines from erosion. [7]

Did you know oysters can change gender?

Oysters are hermaphrodites, meaning they can switch from male to female and vice versa. Usually, oysters begin their lives as males and end as females, which helps in reproduction. [8]






Results

At the beginning of this project, opinions in community were that our waters were unproductive due to development and runoff of contaminants. However, Barbara Albrecht's Project Oyster Pensacola shows quite the opposite. At the end of sampling, a wide variety of different organisms were observed growing on the oysters as well as living in the waters around the cages, including wild oysters, mussels, amphipods, crabs, shrimp, snails, worms, fish and other taxa. In higher salinity waters, coral polyps were also observed growing on the oyster's hard shells, a very rare feat in our North Florida waters. These results show that "given a chance, Mother Nature will come back" (Barbara Albrecht). Our waters are resilient, and given an opportunity, such establishment of oyster reefs and accompanying communities can grow and thrive in our waters. These oysters support the food web setting up a prime environment for other organisms. If these small organisms weren't present, there would be no basis for the ecosystem to thrive. It's a community, and a community needs all its citizens in order to thrive. The small amphipods bring in the bigger crabs and fish which in turn create this amazing ecosystem.

The results from this project showed that growth of oysters was greatest at sites with higher salinities, such as Big Lagoon and Santa Rosa Sound. After big rain events when salinities dropped, more oyster deaths were observed. Area waters with higher dissolved oxygen had higher growth rates of oysters. Is this the end of Project Oyster? No, not even close. Further research needs to be conducted to determine how well the oysters filter out sediments in the waters. There is so much potential for oysters in our waters. This project is a first step toward future research with oysters and the organisms that rely on them. With more citizen and volunteer help, the possibilities are endless to see just what we and these oysters can accomplish.

Works Cited

1

Quick (1969). Summary Report on the Pensacola Bay Marine Mortality Studies. Florida Board of Conservation Marine Research Laboratory. *4p*

2

Quick (1971). Causes of the Escambia Bay Oyster Epizootic of September 1971. Florida Department of Natural Resources Marine Research Laboratory. *7p*

3

Olinger, Rogers, et al (1975). Environmental and Recovery Studies of Escambia Bay and the Pensacola Bay System Florida. United States Environmental Protection Agency. *1-468pp*

4

Young (1971). Investigations of Biological Conditions and Water Quality in Eastern Escambia Bay Relative to Fish and Oyster Mortality During September 1971. Florida Department of Pollution Control. *19p*

5

Isphording, W. C., Jackson, R. B., & Livingston, R. J. (1989). Historic changes in bottom sediment chemistry in northern Gulf of Mexico estuaries. Abstracts with Programs - Geological Society of America, *21(6), 188.*

6

Fimrite, P. (2003, Apr 28). Restoring oysters' world good for bays' health / effort to re-establish shellfish may help clear the waters: FINAL edition]. San Francisco Chronicle

7

Southworth, M., & Mann, R. (1998). Oyster reef broodstock enhancement as a mechanism for rapid oyster reef replenishment. Journal of Shellfish Research, *17(4)*

8

Chung, E., Seo, Y., & Park, K. H. (1998). Sexual maturation, sex ratio and hermaphroditism of the pacific oyster, Crassostrea gigas, on the west coast of korea. Journal of Fisheries Science and Technology, *1(1), 82-93.*