Oyster Feasibility Surveys

Zane Shapiro, 1/5/20-3/9/22

Abstract:

Oysters are vital in Tampa Bay, especially due to a huge loss in their population in the last 50 years. This project was based on assessing one area, three beds in total. The oyster bed surveys were conducted during December, January, March, and April of 2021. All the surveys took place at Perico Bayou in Robinson Preserve which is in Manatee County. There was a total of four surveys, two in winter and two in spring. The goal was to see if the oyster beds that were in Perico Bayou were viable. In order to assess the viability of the beds, the percent alive and dead plus shell length of Perico Bayou beds were compared with that of natural beds in Tampa Bay. Data were collected from four different oyster beds within the bayou throughout the year. According to the data, the average percentage of live oysters was about 32% and about 67% dead oysters. According to Gary Raulerson, who has a Ph.D. in Ecology and works for the Tampa Bay Estuary Program (TBEP), natural reefs have about 74% live oysters and about 25% dead oysters. Mr. Raulerson also stated that natural oyster beds have an average shell length of 4.0 cm, while the average for Perico Bayou surveys was 4.6 cm. The hypothesis for why there is a lower percentage alive in Perico Bayou is because of such a low flow of water through the bayou, they were exposed to the sun for too long, and their defecation accumulated. The reason for the larger than average shell length could be because the surviving oysters may be receiving more nutrients for themselves and not competing for those nutrients, over the natural beds with a higher percentage of live oysters. The data shows that Perico Bayou beds are likely not as viable as natural beds elsewhere in Tampa Bay.

Image 1: Oyster bed at Perico Bayou

Image 1 of exposed oyster bed within Perico Bayou at Robinson Preserve, one of the test sites.

Introduction:

In the 1800's oysters were so common in Florida that everywhere people went they saw oysters everywhere in brackish water environments, (Kinnaird, 1946). Why were oysters observed for this project? There are many reasons why oysters are vital, especially for Florida. The Eastern Oyster which is the only native species to Florida is a keystone species, which means the entire ecosystem needs them to survive. They provide shelter for juvenile marine animals and they provide food for bigger marine animals and sea birds. They also filter the water removing almost all the pollutants from the water and improving water clarity. This helps all the marine life, and it helps the seagrass beds which need clear water to be able to thrive. In other words, without oysters everything else will be in deep trouble.

Literature review:

“Oysters are the quiet, unsung heroes of our estuaries, working hard every day to protect our coasts, clean our waters, feed and shelter fish, birds, crabs, shrimp and other wildlife.” (Why we’re restoring, 2018). This supports my claim about how oysters are vital for our ecosystems, especially here in Florida. They are nurseries, food sources, storm breakers, filters, and so much more.

“Oysters have remarkable ecological value. They are considered among the most efficient and successful ‘keystone species’, which is a species that exerts strong influence on the diversity and structure of the communities within which they exist. Individual oysters are capable of filtering particles from the water column at a rate of about 50 gallons a day. This leads to improved water quality, which in turn contributes to a healthy estuary and promotes the growth of sea grass meadows. Oyster reefs provide critical refuge, feeding grounds, and nursery habitat to many other economically and ecologically important fish and invertebrate species, and feeding habitat for shorebirds.” This directly supports what was said about Oyster beds helping sustain Seagrass beds (Coastal and Marine Laboratory).

Methodology:

The organism studied was the Eastern Oyster. All the surveys took place in Perico Bayou in Bradenton Florida. Latitude and longitude of the site are 27.5047413°, -82.6738859°. This was a brackish water environment surrounded by mangroves, seagrass beds, and oyster beds. The methodology was simple. First, everyone conducted a cleanup at the boat ramp area. It looked so much cleaner afterwards. Then, the surveyors kayaked from the boat ramp all the way to the oyster beds (about a 30–40-minute kayak). After arriving, the surveyors used 0.25m^2 quadrats to collect data. On the data sheets there was percent alive and percent dead, which was visually estimated using the quadrats. Each two-person survey collected eight quadrat measurements per survey. Within each quadrat the length, width, and shell thickness a caliper was used to measure (in centimeters) 3 of the live oysters. Then, the surveyors would kayak back, and this was conducted four separate times.

Figure 1: Maps of Perico Bayou

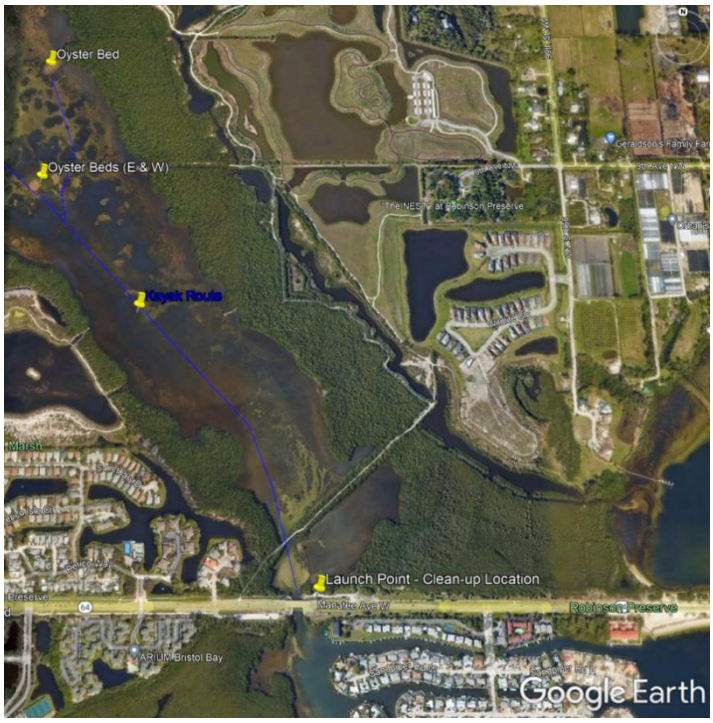


Fig. 1: Maps of Perico Bayou and its amenities from Manatee County; Satellite image of study sites including launch point and oyster beds surveyed.

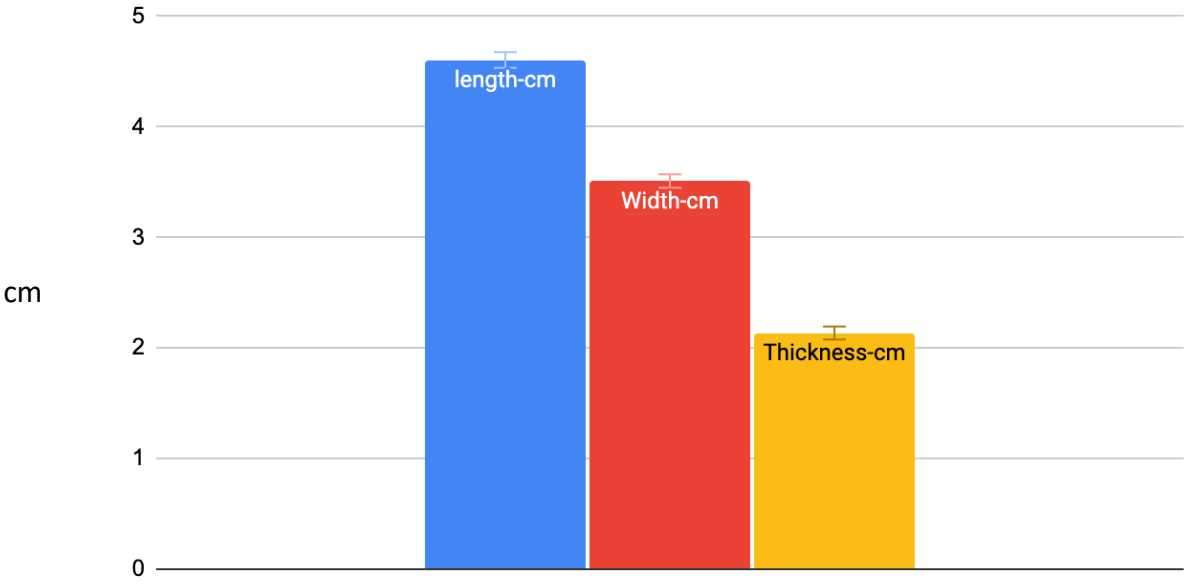
Results:

In short, the data have indicated the Perico Bayou beds are less viable compared to natural oyster beds in the Tampa Bay area. Natural oysters were smaller though. Oysters in Perico bayou had an average length of 4.6 cm (Table 1, Graph 1), as the average oyster length for Tampa Bay was 3.2-4 cm (Table 1), according to Gary Raulerson who has a Ph.D. in ecology and works for the Tampa Bay Estuary Program. He also concluded that the average percent of live oysters was 74% (Table 1). In Perico Bayou the average live oyster percentage was 32% (Table 1, Graph 2). This confirms that there is another factor involved that is not letting the oysters thrive in Perico Bayou. I did not get an average oyster width or shell thickness from Mr. Raulerson. I did collect that data on the surveys though. The average width was 3.5 cm and the average shell thickness was 2.1 cm (Table 1, Graph 1).

Table 1: Oyster sizes and percent live vs. dead

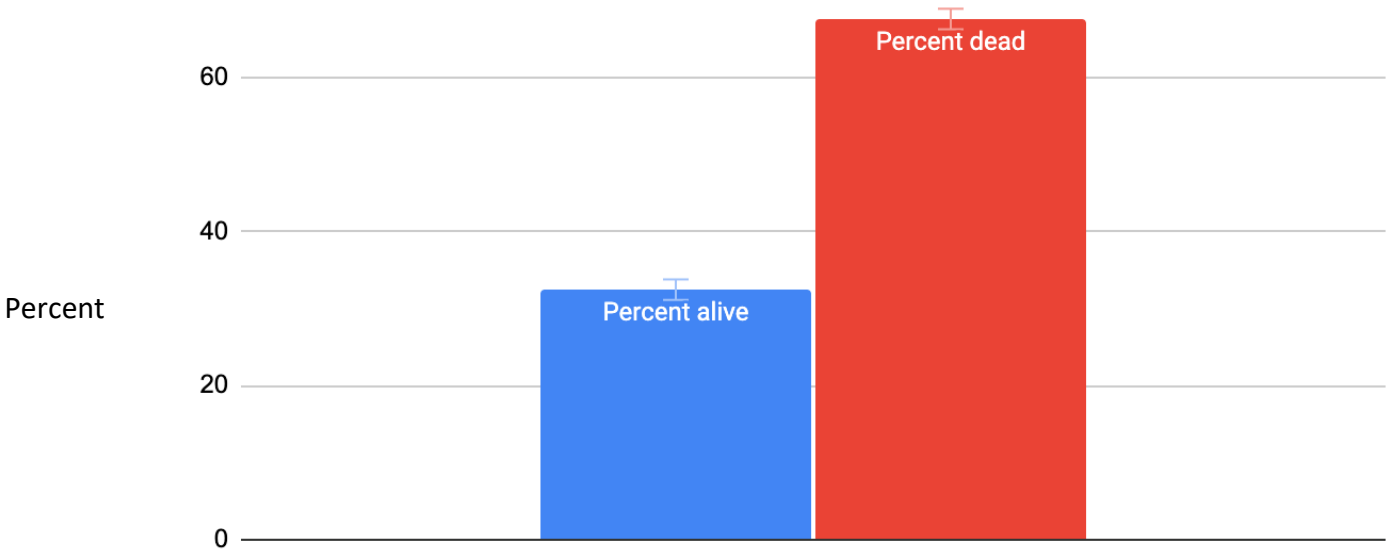
	%Live	%Dead	Length (cm)	Width (cm)	Thickness (cm)
Average	32.44	67.55	4.61	3.51	2.14
Standard Deviation	20.58	20.58	1.10	0.94	0.91
Mode	40	60	5	4	2.5
Median	30	70	4.5	3.4	2
Max value	90	95	7.8	9.5	6.7
Min value	5	10	0.7	1	0.4
Natural bed average length		3.2-4 cm		74% live	26% dead

Graph 1: Oyster average sizes



In graph 1 the average measurements of the oysters are recorded from Perico Bayou.

Graph 2: Percent live vs. dead



In graph 2 the average percent live and dead of the oysters at Perico Bayou is recorded.

Discussion:

The beds appear to not be doing so well. Since the average percent alive is about 40% less than the natural beds, they do not appear to be very viable. This could be from a multitude of reasons. One thing that was noticed was that many of the oysters got little to no water cover, and just baked in the sun for hours and hours. Another thing that was noticed was that even at high tide there was barely any water flow. So, the oysters were also probably basking in their own feces as well. Good things that were noticed were that the oysters that were alive were very large oysters which means they were probably getting some good nutrients to grow large. Surveyors also noticed a lot of wildlife; a dozen-plus species of aquatic birds, sea stars, upside down jellies, fish, crabs, seagrass, a smallish shark and an alligator. It appears that the oysters just need a location that is a little deeper and has more water flow between high and low tide.

Acknowledgments:

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Citations:

"2018." *62-330.632 : General Permit for the Restoration, Establishment and Enhancement of Low Profile Oyster Habitat - Florida Administrative Rules, Law, Code, Register - FAC, Far, Erulemaking*, Florida Administrative Code and Florida Administrative Register , 1 June 2018, https://www.flrules.org/gateway/ruleNo.asp?id=62-330.632.

"About TBEP - Vision, Priorities & History." *Tampa Bay Estuary Program*, 8 Feb. 2022, https://tbep.org/about-tbep/.

"Coastal and Marine Laboratory." *Coastal and Marine Laboratory*, Florida State University, https://marinelab.fsu.edu/absi/commengage/aboutoyster/ecosyst_serv/.

Kinnaird, Lawrence. *Spain in the Mississippi Valley, 1765-1794*. Vol. 4, U.S Government Printing Office, 1946.

"Oyster Restoration Workgroup." *Oyster Restoration Workgroup RSS*, http://www.oyster-restoration.org/.

"Why We're Restoring Florida's Oyster Reefs." *Restoring Florida's Oyster Reefs*, The Nature Conservancy, 10 Sept. 2018, https://www.nature.org/en-us/about-us/where-we-work/united-states/florida/stories-in-florida/floridas-oyster-reef-restoration-program/.