Eastern Oyster (*Crassostrea virginica*) Demographics within Alligator Harbor

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Background:

Oysters are an important species that filter nitrogenous compounds out of the water to maintain a healthy environment for a community of organisms (Lockwood and Mann 2015). Oyster populations in Apalachicola Bay, FL have seen significant decline in recent years, prompting the Florida Fish and Wildlife Conservation Commission (FWC) to place a moratorium on harvesting oysters within the Bay until 2025. During this time, there is ongoing research undertaken by the Apalachicola Bay System Initiative (ABSI), which will be utilized to further determine sustainable management suggestions and ongoing restoration efforts. In comparison to sub-tidal oysters, there is little research regarding the demographics of intertidal oysters in the Bay (Brooke et al. 2022)

Introduction:

- My research will further monitor intertidal oyster populations in Alligator Harbor by detailing oyster demographics, predation, and localized water quality parameters
- The data collected and analyzed from this project will aim to inform development of management strategies to promote the overall health of the Bay

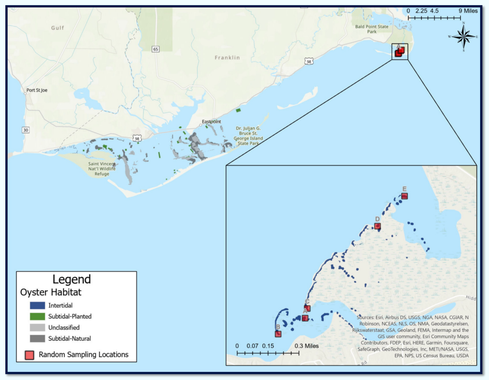


Figure 1 (Above): Map of the Apalachicola Bay System and the various types of oyster habitats.

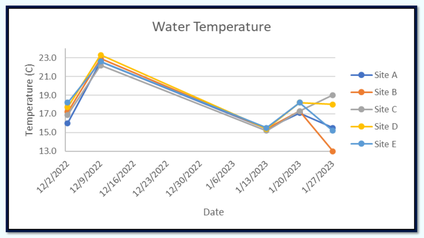
Methods:

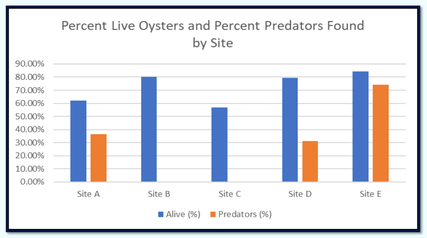
- Five reefs in Alligator Harbor (AH) were chosen using ArcGIS Pro and Fieldmaps to generate random sample points within the parameters of complete or partial exposure during high tide
- Each of the five sites were sampled once per week
- A random number generator was used to provide a number to determine the compass direction to throw a quadrat (Fig. 2) from each site point.
- Height (mm) was measured using calipers for live and box oysters (Fig. 3) within the quadrat.
- Predator presence/absence and size was recorded.
- Temperature, salinity, pH, dissolved oxygen (percentage and milligrams per liter), specific conductance, and turbidity were taken at each site using a YSI hand-held water quality meter.
- Data was quality checked and analyzed in Excel.

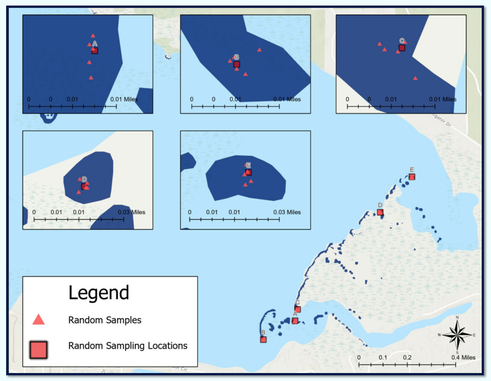
Figure 2 (Above): Quadrat used to collect data at site. Alligator Harbor (AH), site A, week 4 of collection (signified by the letter D) .

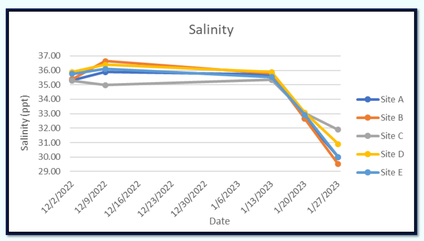
Figure 3 (Above, Red Box): Box Oyster—Dead oyster in which the shell remains intact. If a dead oyster shell has been split, it is called a half shell.

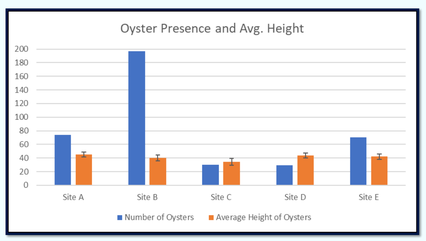
Results:

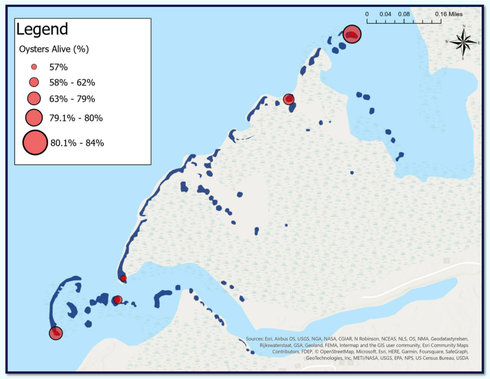


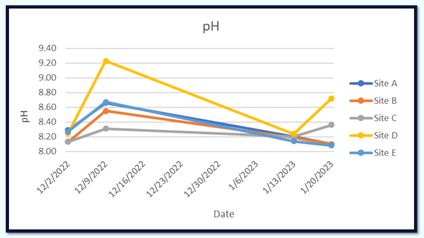












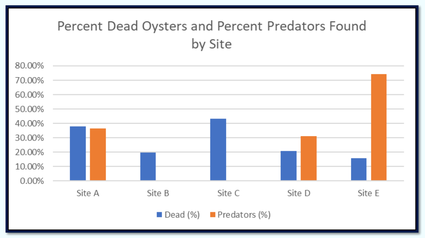


Figure 4a (Top Left): Illustrates the change in temperature over time.
Figure 4b (Left Center): Illustrates the change in salinity over time.
Figure 4c (Bottom Left): Illustrates the change in pH levels over time.

Figure 5a (Top Right): Relationship between percentage of live oysters and percentage of times predators were present at each site.
Figure 5b (Right Center): Illustrates the number of oysters found at each site in comparison to the average height of oysters found there.
Figure 5c (Bottom Right): Illustrates the percentage of dead (box) oysters found at each site in comparison with the percentage of times predators were present at the site.

Figure 6 (Top): Detailed map of the five sites chosen for random sampling and areas at each site where each sample was taken.
Figure 7 (Bottom): Map illustrating percentage of live oysters found at each site.

Conclusion:

- Water temperature, salinity, and pH illustrate a drastic change on or following 1/13/23, corresponding to a rapid drop in air temperature(Fig. 4)
- Site B has the greatest number of oysters (Fig. 5b)
- Site E has a high percentage of living oysters, a low percentage of box oysters, and a high percentage for predator presence (Fig. 5a and Fig. 5c)
- Predator presence has little effect on the overall survivability of oysters (Fig. 5a)

Figure 8 (Above): Alligator Harbor, Florida.

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References:

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