Factors Driving Reproductive Differences Between *Crassostrea virginica* in the Eastern and Western Sides of Apalachicola Bay

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Introduction:

Historically, Apalachicola Bay accounted for 10% of commercially harvested oysters in the US, and 90% in Florida. However, its population of Eastern oysters (*C. virginica*) collapsed in 2012[1] and has shown slow signs of recovery[2], despite a five-year harvesting moratorium and other restoration efforts[3].

This population collapse occurred due to a combination of factors, including, but not limited to, persistent unfavorable environmental conditions and overharvesting. However, it is unclear why the population has not recovered[1], and the reproductive patterns of wild oysters in the bay are unknown.

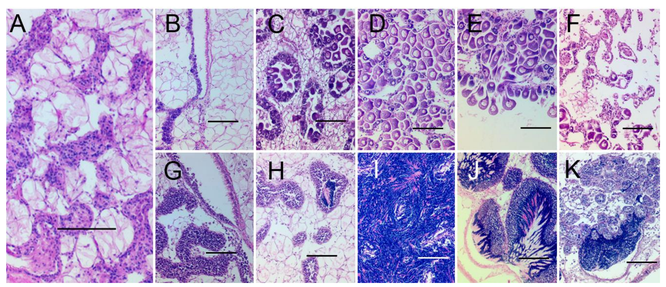
This project sought to understand what differences existed between the East and West sides of the bay. Data on the oysters' reproductive health, productivity, and abiotic factors like salinity and temperature, from both sides were compared.

Methods:

25 Eastern oysters were collected from the East and West sides of Apalachicola Bay by the Florida Fish and Wildlife Conservation Commission (FWC) every month of 2016.

These oysters were then dissected and processed into microscope slides using paraffin histology. These slides were used to identify sex, gametogenic stage, and presence of parasites.

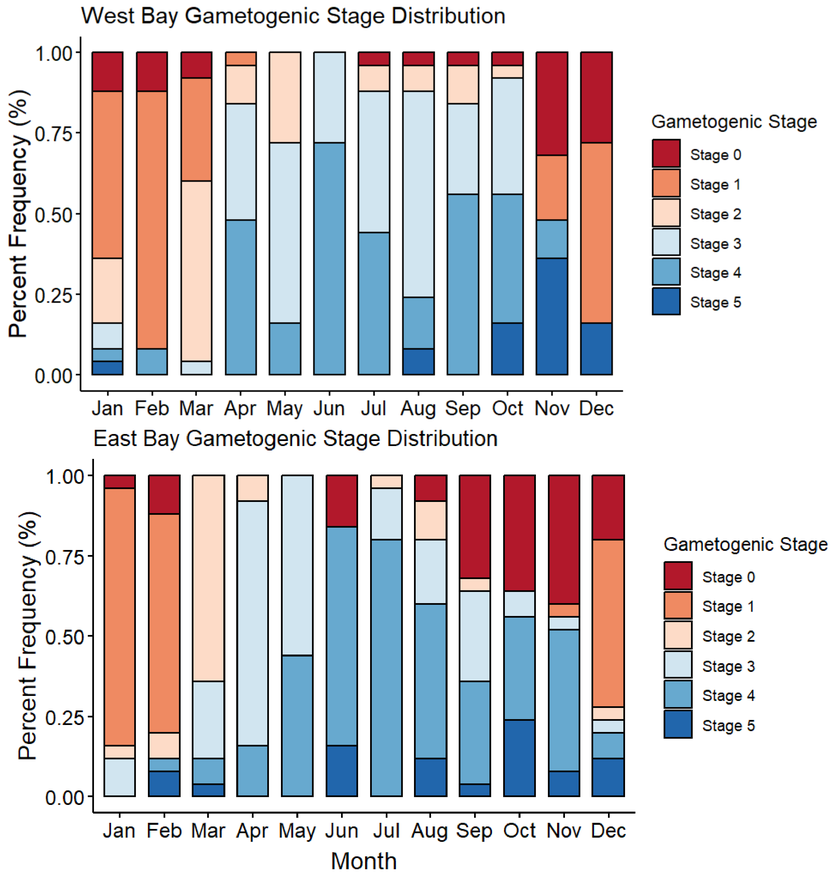
Data analysis was done in Microsoft Excel and RStudio. Salinity and temperature data were accessed from the National Estuarine Research Reserve System from Dry Bar (West) and Cat Point (East) stations.



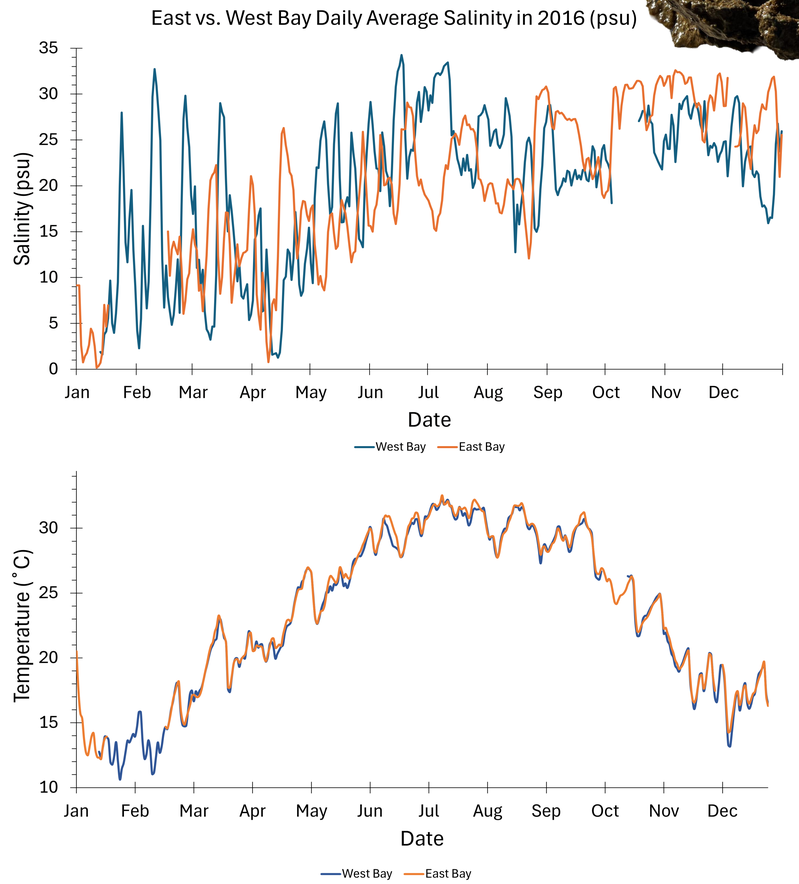
Stages for female (B-F) and male (G-K) *C. virginica*:

Stage 0: inactive (A), Stage 1: early gametogenesis (B, G), Stage 2: late gametogenesis (C, H), Stage 3: mature (D, I), Stage 4: spawning (E, J), Stage 5: post-spawning (F, K). All scale bars are 100 µm.

Results:



Percent distribution of gametogenic stages in samples collected in West Bay (top) and East Bay (bottom) in Apalachicola Bay, FL, in 2016. Gametogenic patterns in West Bay appeared to slightly lag behind those in the Eastern side of the Bay.



Average daily salinity (top) and temperature (bottom) between the Eastern and Western sides of Apalachicola Bay, FL, in 2016. No statistically significant differences were observed, although West Bay experienced a greater salinity range.

Discussion:

- Temperatures in the East and West Bay matched closely and followed the same curved trend, starting and ending low and peaking in July.
- Salinity, while not being statistically significant, had greater difference between the two sides; West Bay was more erratic in oscillations.
- In terms of gametogenic stages, West Bay seemed to trail East Bay. Individuals progressed into Stage 4 (spawning) earlier in East Bay.
- Greater proportions of individuals in mature gametogenic stages were observed in the summer months (June-August), indicating that temperature could be correlated with gamete maturation.
- Salinity was visibly more erratic in the West Bay, potentially contributing to its more erratic gametogenic stages.

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References: