

Examining the Predatory Relationship Between the Invasive Green Crab (*Carcinus maenas*) and the Indigenous Blue Mussel (*Mytilus edulis*) in the Gulf of Maine

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Green crabs (*Carcinus maenas*) are an invasive species in Maine that have severely impacted marine environments and decimated commercially-significant bivalve populations, including the blue mussel (*Mytilus edulis*). To collect green crab demographic data on Southport Island, ME, this study conducted three separate trapping surveys at six sites. Three field experiments evaluated the relationship between mussel size, crab size, and mussel survival rates in a natural marine environment. Three crab and four mussel sizes were utilized, with a 6 x 6 randomized matrix of plastic horticulture pots in each experimental set-up. Trapping surveys documented an increase in the mean number of green crabs per trap across all three intervals (max=28.5 crabs/trap). Two-way ANOVAs with the three experiments yielded mussel size as a significant factor in all three and crab size in two ($p \leq 0.05$). The results confirmed the first hypothesis: extra-small mussels were most vulnerable to predation from all crab sizes (% survival=0.7%), significant small and large mussel mortality rates were caused by medium and large crabs, and large crabs consumed a significant amount of extra-large mussels. The magnitude of shell destruction was one surprising outcome. In addition, large crabs consumed the largest range of mussel sizes, confirming the second hypothesis. Larger mussels were more likely to form clumps in experimental units. Findings are directly applicable to interactions between natural mussel beds and green crabs, and they suggest serious negative implications for mussel populations in Midcoast Maine. This study emphasizes mussel aquaculture as critical to saving mussel populations.

Awards Won:

Third Award of \$1,000