Oyster Reef Sustainability, A Piece of the Puzzle: Gamete Viability in Crassostrea virginica; Determining Temporal and Concentration Constraints

Weissberg, Justin

Quantifying successful fertilization of free spawning organisms in the wild requires an understanding of how sperm and eggs interact under various concentration and temporal constraints. In the laboratory, I explored the impact of sperm concentration and gamete age on fertilization in the eastern oyster (Crassostrea virginica). The degree that gamete age and sperm concentration influence fertilization in Crassostrea virginica has not yet been examined. This data is necessary to determine the critical mass and reef structure for a self-sustainable oyster population in the wild. In order to assess the influence of gamete age on fertilization, the sperm and eggs were combined over increasing intervals of time (25, 45, 65, 85, 145, and 205 minutes). The sperm used during this process had different concentrations (10^-1, 10^-2, 10^-3, and 10^-4), while the egg concentration was kept constant throughout the entire experiment. The ratio of zygotes to the total number of eggs for each sample was calculated using a Sedgewick counting chamber. It was determined that sperm concentration had a more significant impact than gamete age on fertilization. The results revealed that as gamete age increases, fertilization success decreases. They also indicated that as sperm dilutes, fertilization success decreases. Gamete age plotted against percent fertilization had an exponential relationship. Sperm concentration plotted against percent fertilization displayed a logarithmic relationship. These results are the first step in developing a robust model for increased longevity of reefs in the wild.

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