

**Disease on the Half-Shell: Prevalence and impact of the protistan pathogen MSX on oyster population health in the Gulf of Maine**  
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The aim of this project has been to establish a reputable baseline for MSX prevalence in both the water column as well as farmed oyster populations in the Gulf of Maine. Research was first undertaken in 2015 as part of the Bowdoin Marine Science Semester and those pilot results served as preliminary findings, providing interesting and relevant data to ecosystem health in the Gulf of Maine that illustrated the potential for and importance of further research.

Oysters continue to be a vital species to the Gulf of Maine, both economically as a fast-growing commercial sector as well as environmentally as organisms that filter water, create breakwaters, and provide habitat to other species. For these reasons, healthy stocks are very important. However, oysters, specifically the American or Eastern oyster, *Crassostrea virginica*, face numerous diseases, a number of which can lead to mortality. One of these diseases is called MSX and it widely believed to be the culprit of a number of recent mass mortality events.

MSX is a disease caused by the protistan parasite *Haplosporidium nelsoni*. The outcome of infection can be quite severe, including reduced fertility, recurrent infection, susceptibility to other pathogens, and even death. Despite this, and despite the mass mortality events attributed to MSX across the Eastern US since the 1960s, very little of its epizootiology is known.

In order to accomplish the aim of this project, I have focused heavily on increasing the number of samples and the number of sample sites as well as improving and diversifying the lab techniques used for detection and quantification of MSX prevalence. Much of this has been accomplished through a partnership with the lab of José Fernández-Robledo at Bigelow Laboratory for Ocean Sciences. A large focus of the project thus far has been project preparation, coordination between laboratories, and mastery of necessary skills to successfully undertake this research.

In determining the scope of my project and working between both laboratories, I have inherited a large number of samples, spanning several years and several different sites along the coast, which I have begun to analyze. Such analysis includes working directly with the oysters to obtain necessary tissue samples as well as laboratory work centering around a specific technique called quantitative polymerase-chain reaction, allowing both the detection of the protistan parasite in the sample and well as its relative abundance. Because the research is ongoing and establishing a baseline requires a comprehensive analysis, the results continue to be realized.

As a young scientist, this process has been incredibly rewarding and informative. I have been fortunate enough to become a part of 'Pathogens of Bivalve Mollusks in Maine' working group, to learn a host of new techniques for improved detection and quantification, and I have gotten the opportunity to meet and learn from other scientists in the field. I am extremely grateful to have been given this opportunity to undertake research that is directly important to the Gulf of Maine.

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