Research Abstract

New York City uses a combined sewage water system where wastewater and stormwater flow through the same pipes to water treatment plants. When the city experiences heavy rains or floods these plants reach full capacity. This leads to an overflow, dumping untreated sewage and stormwater into NYC’s waterways. Not only is this waste water harmful to humans, but is detrimental to the inflow of nitrogen in New York’s river. This pollutes the water for sea life and makes attractive ecosystem services unuseable to the public. Therefore, in order to combat ongoing pollution of waterways, nonprofit organizations, like the Billion Oyster Project, are looking to restore the harbor. The restoration of once-abundant local oyster reefs could help filter water and remove excess nitrogen from NYC’s harbors. Oysters could also provide other services such as shoreline protection, habitat creation, and carbon sequestration.

One major issue currently facing oyster restoration efforts is high mortality in introduced oysters due to predation. While the oyster reefs have disappeared due to human overfishing, the oyster’s natural predators are still lurking in the local waters and may seriously impede restoration attempts by decimating planted oysters. While losses to large predators such as blue crabs may be reduced by placing oysters in cages, smaller predators can also cause major damage. . Oyster drills are a predatory snail feed on oysters and other for shellfish by drilling a hole through the shells of their bivalve prey. Drills, can devastate entire oyster beds, creating a problem for those trying to restore reefs.One solution for allowing oysters to exist in drill-infested waters may be to reintroduce larger oysters. Oysters may reach a size refuge, or length at which drills are no longer able to consume them. However, rearing larger oysters increases costs for restoration groups.Determining if a size refuge exists would thus directly inform restoration efforts. It could also aid aquaculture efforts, as drills are also a major source of aquaculture mortality. To address this we carried out feeding trials to determine how the size of drills related to the rate and ability to feed on various sizes of oysters.

Experimental Design

Experiments are being carried out in the wet lab of the Billion Oyster Project on Govenor’s island New York. Glass containers were filled with 600ml of local harbor water. Each container was covered to reduce evaporation. An air stone was placed in each container for circulation (powered by tubing fed through a 5/16” hole in the lid); ten additionaly 1/8th holes allowed for air circulation.

Each jar was assigned to a predator, daily control, or long-term control treatment. Predator jars contained drills and oysters, while control jars only contained oysters. Oysters used in the experiment were clutchless oysters produced by local growers and grown over the past two years by the Billion Oyster Project. Drills were collected from local waters. . Each oyster and oyster drill will be measured and massed before being placed in its respective jar. Containers will be checked daily for drill location, oyster mortality, and presence of drill holes. If the oyster dies, it will be massed, measured, and packaged to be kept in a labeled bag to be sent to the lab. If drills are not attached a water change will be conducted.

Containers in the daily control group also undergo daily water changes and serve as a check for daily water change impacts. Long-term control group containers are only changed every 2 weeks, which corresponds to the maximum length of time a container will be monitored before the drill and/or oyster are replaced.

An initial pilot study of 16 containers has been started. We will add to this setup in the coming weeks. All data will be analyzed to determine if a relationship exists between the size of oyster drills of a given size can consumed and if an overall size refuge from drill predation exists for oysters.