



# Planting Oysters in the Big Apple

## *Does size affect interactions between an oyster and its predator?*

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### Introduction

New York City was built next to rivers, on top of salt marshes, and over surrounding bays. The brackish water in these areas once formed a perfect habitat for the eastern oyster (*Crassostrea virginica*). Commercial fishing, water pollution, and habitat loss, however, have removed almost all of the natural oyster reefs that were once found throughout NYC. This has led to the loss of ecosystem services including

- Water Filtration/Purification
- Wave Attenuation
- Denitrification
- Habitat Creation

The past decade has seen a growing push to restore local reefs. After growing oysters in hatcheries, oysters are outplanted to local sites to begin reef restoration. One issue facing these efforts is the impact of predators on outplanted oysters. For example, populations of Atlantic Oyster Drills (*Urosalpinx cinerea*) have decimated oysters put out into the harbor and are a large issue in oyster reef restoration.

### Objective

Oysters can be outplanted at various sizes. Although smaller oysters may be easier to maintain in hatcheries and transport, they also may be more likely to be preyed upon. We studied how oyster size relates to mortality due to predation by oyster drills to determine if a size refuge from predation exists. This work can inform restoration efforts such as those undertaken by the Billion Oyster Project as they release oysters into the waters of NYC.



Oyster drills are a huge problem in restoration, with sites like Brooklyn Bridge Park (on the right) having average of 45 drills per oyster cage, decimating the outplanted oysters

### Methodology

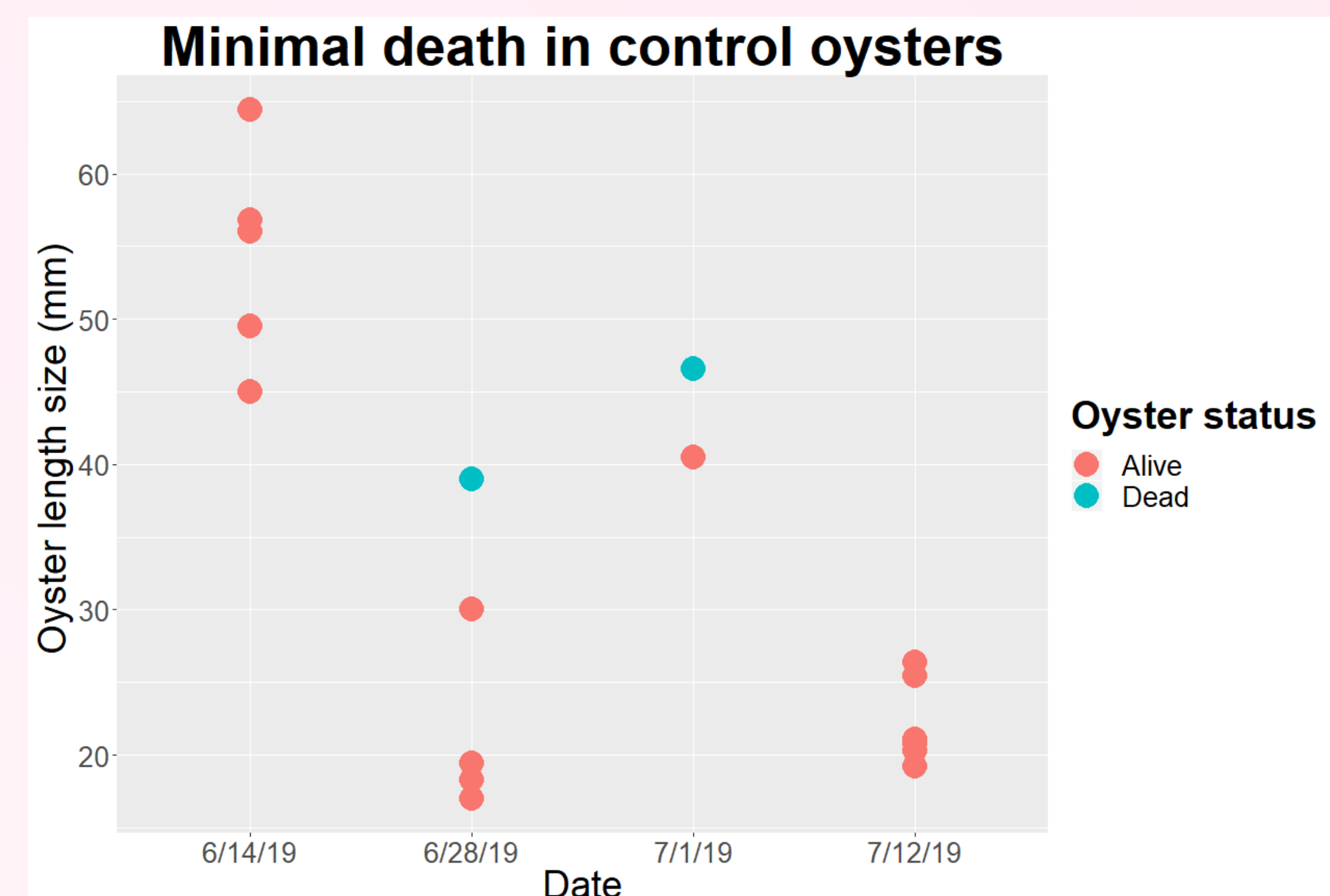
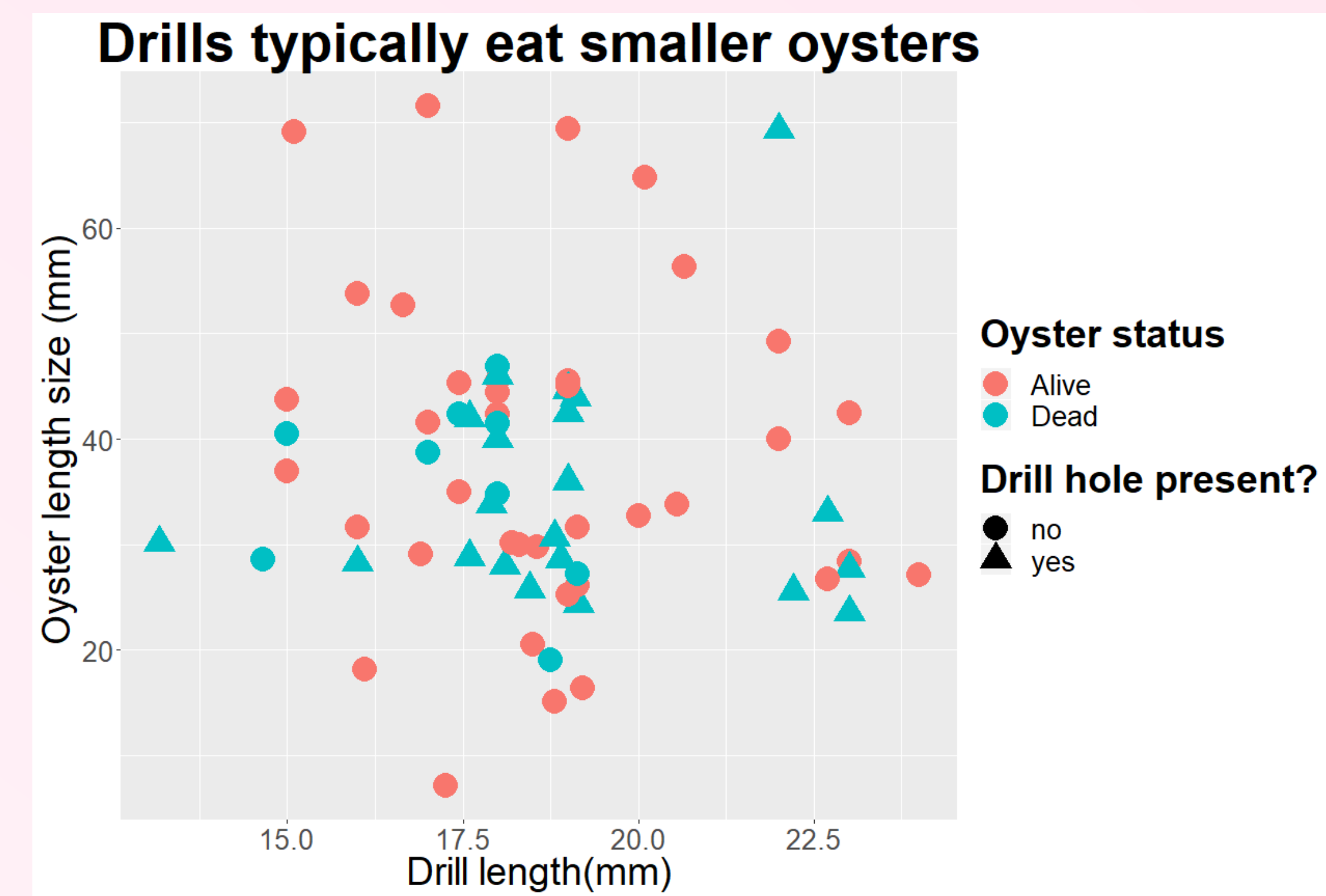


- Oysters were measured and held in 800 ml glass jars that were filled with 600 ml of brackish water from the Hudson River and aerated with an air stone.
- Oyster drills were added to 20 jars; the other 6 served as controls to ensure our methods did not lead to oyster mortality.
- Jars were observed every weekday for oyster mortality; salinity, water temperature, and location of the oyster drill were also recorded
- Oysters were replaced upon death or after 2 weeks (maximum exposure time)



Photo credit: <https://www.travelandleisure.com/travel-guide/new-york-city/things-to-do/brooklyn-bridge-park>

### Results

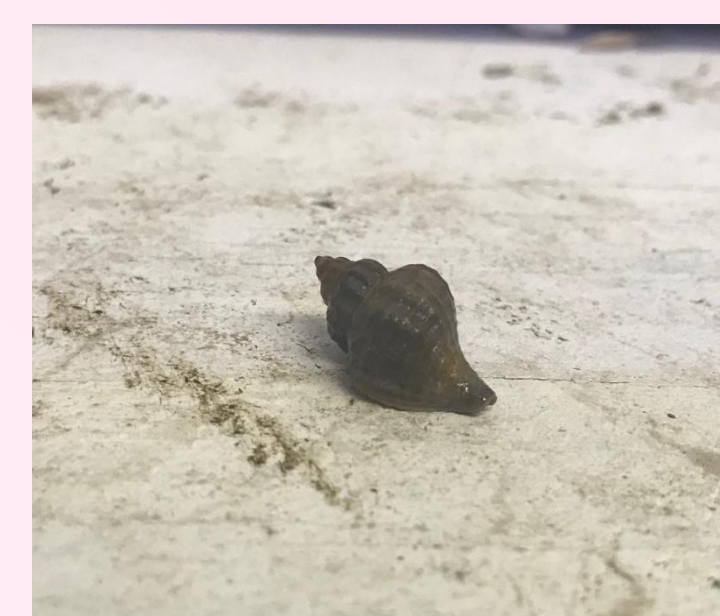
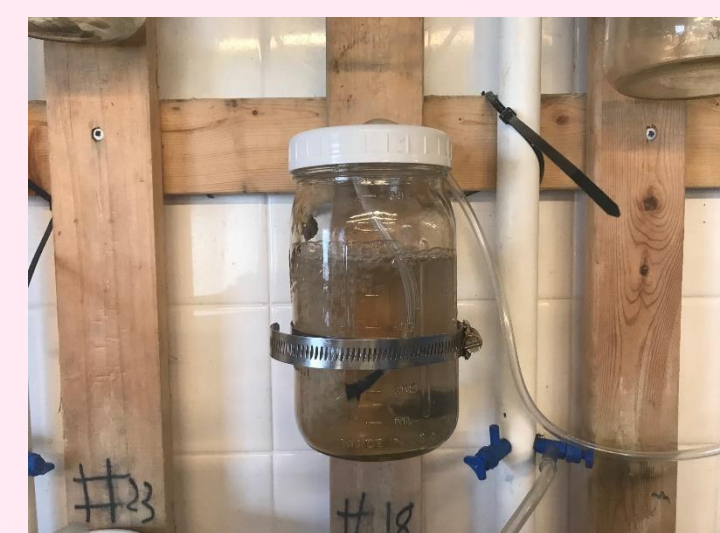


- Eastern Oysters above about 50mm in length are least likely to be eaten by Atlantic Oyster Drills
- We suggest that oysters that are used to restore reefs in predator-impacted areas be outplanted at 50mm-70mm

### Next Steps

Along with impacting prey through consumption, the presence of predators may also change how oysters provide ecosystem services. "Scared" oysters may eat less, changing impacts on water filtration, habitat creation, and denitrification.

To consider this issue we will next use our system to test if predator presence impacts oyster filtration and if those impacts depend on the size of the oyster. To do this, we will quantify chlorophyll-a filtration by oysters in the presence and absence of predators. Chlorophyll-a is a pigment that is found in the chloroplasts of algae (oyster food) that allows for photosynthesis.



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