

Community Oyster Project 2023



Purpose

The Eastern oyster (*Crassostrea virginica*) is native to the Hudson River and once grew with great abundance; the oyster population today is less than 0.01% of what it once was historically (McCann 2018). The Eastern oyster performs ecosystem services that are valuable to preserving and improving the health of the River such as nutrient fixation and habitat engineering. The Park's River Project conducts a variety of oyster monitoring projects to better understand the growth, mortality and function of oyster populations within the Park's Estuarine Sanctuary. Hudson River Park has undertaken large-scale habitat restoration projects including the Tribeca and Gansevoort Habitat Enhancement Projects (2021-2023) which saw the deployment of 300+ submerged habitat structures, set with a combined 35 million juvenile oysters.

The Community Oyster Project was originally launched in 2017 to assess the potential of historic pile field sites as oyster habitat. Oyster wraps – aquaculture mesh enclosures deployed around old pilings at Pier 32 – are monitored yearly to assess oyster growth within the Park. Today, the Community Oyster Project continues to engage students and volunteers in environmental fieldwork and stewardship.

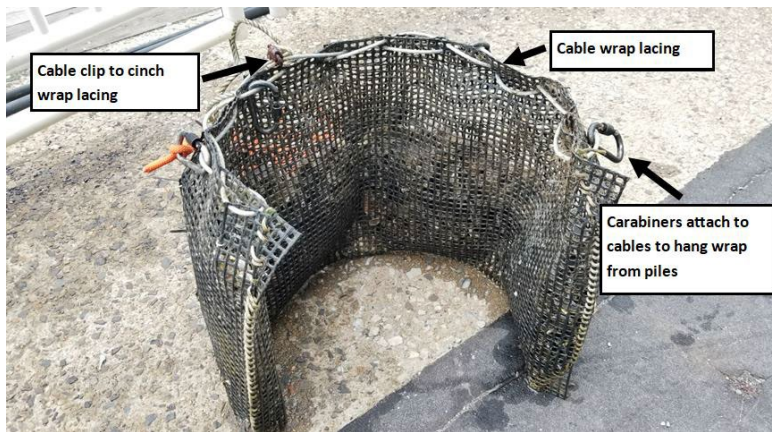


Fig. 1 | A standard oyster wrap with various components labeled.



Fig. 2 | Oyster wrap being deployed for winter in the Pier 32 pile field, October 2023.

Key Research Questions

- How do oyster length and mass change over the monitoring season?
- How can oyster monitoring events engage volunteers of various age and career levels?
- What other species in the ecosystem are supported by the oyster reef community?

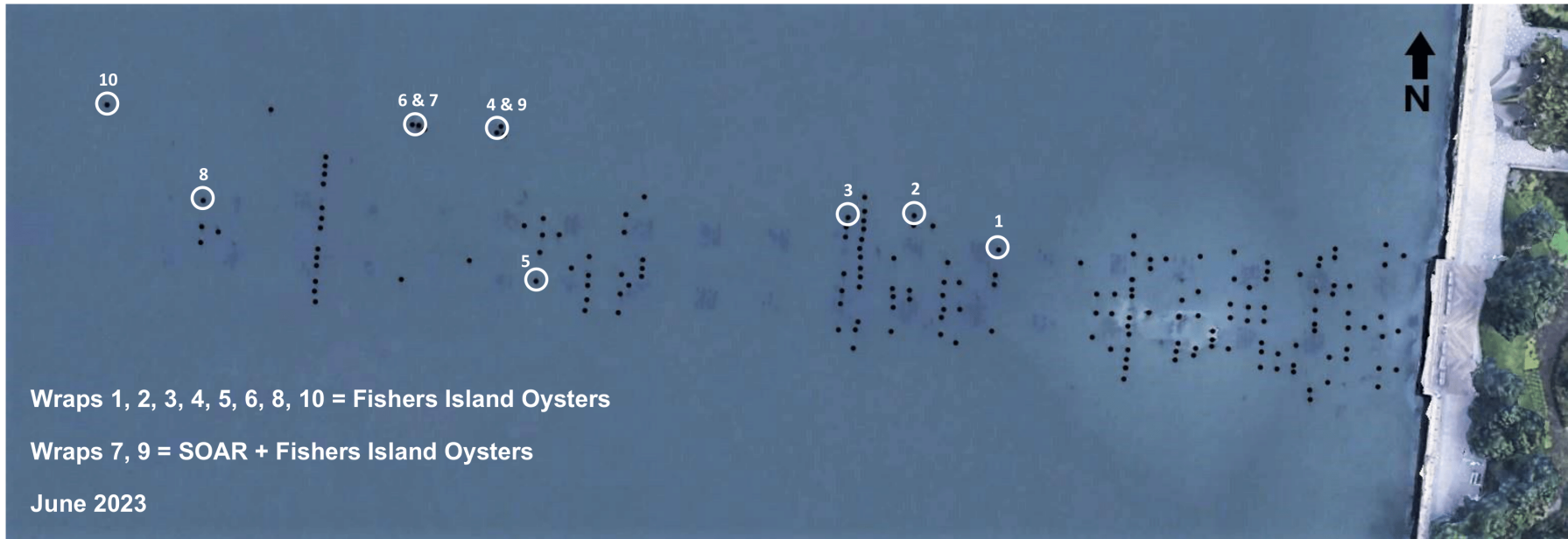


Fig. 3 | Satellite map of Pier 32 pile field; indicating oyster wrap placements in 2023.

Methods

- Oyster wraps are temporary oyster habitat structures made of marine-grade mesh. They are attached to piles with PVC-coated steel cable (**Fig. 1**).
- Community Project oysters come from two stocks: Fishers Island and the Supporting Oyster Aquaculture and Restoration (SOAR) program.
- Each year, a subset of the wraps are retrieved and monitored monthly during the peak growth season (June-October).
- In 2023, wraps 3, 4, 6, 7 and 9 were monitored with the help of corporate groups and student volunteers.
 - All oysters are initially checked for mortality. Then, a random sample of 50 oysters is measured and weighed.
 - Dead oysters, once measured, are split to avoid double counting.
- Wraps were returned to the pile field for overwintering in November 2023.
- Data analyzed using Microsoft Excel.

Major Findings

Growth

- Fishers Island oysters have exhibited average increases in length of 30.1mm or +48% ($p < 0.001$) and mass of 66.5g or +200% ($p < 0.001$) since 2018. Growth has slowed significantly since winter of 2020/2021.
- SOAR oysters displayed average increases in length of 31.9mm or +50% ($p < 0.001$) and mass of 81.6g or +360% ($p < 0.001$) since 2021. Growth has started to slow this year as these oysters age.
- Across all wraps from June-October 2023, average length increased by 2.3mm (**Fig. 6a**), and average mass by 11g ($p = 0.04$) (**Fig. 6b**)

Mortality

- Oyster wrap subsets (~50 individuals) experienced a highly variable 1-18% mortality rate each month, slightly lower than last year's observed range. Overwinter mortality continues to be common and present at higher rates.

Supported Species

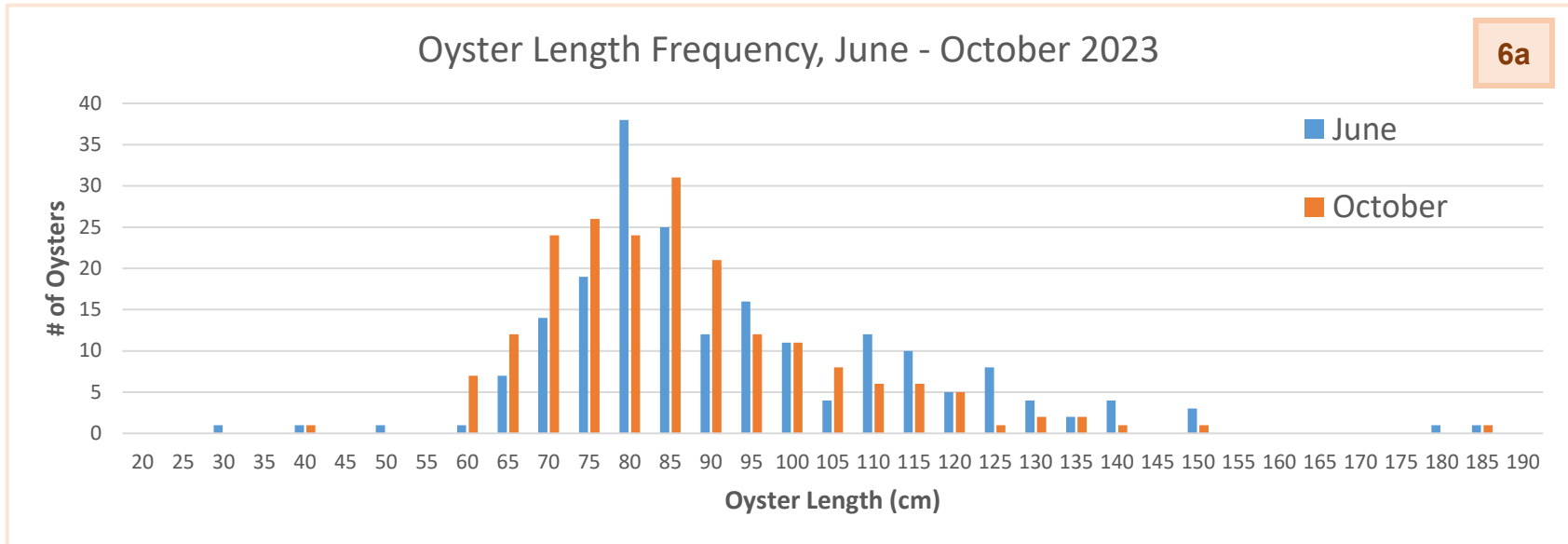
- A variety of mobile species were observed inside the wraps including as oyster toadfish (*Opsanus tau*), skillettfish (*Gobiesox strumosus*) (**Fig. 5**), blue crabs (*Callinectes sapidus*), mud crabs (*Panopeus* & *Rhithropanopeus sp.*)
- Innumerable sessile organisms were additionally found encrusting the oyster shells, including sponges, barnacles, polychaetes, anemones, and more.



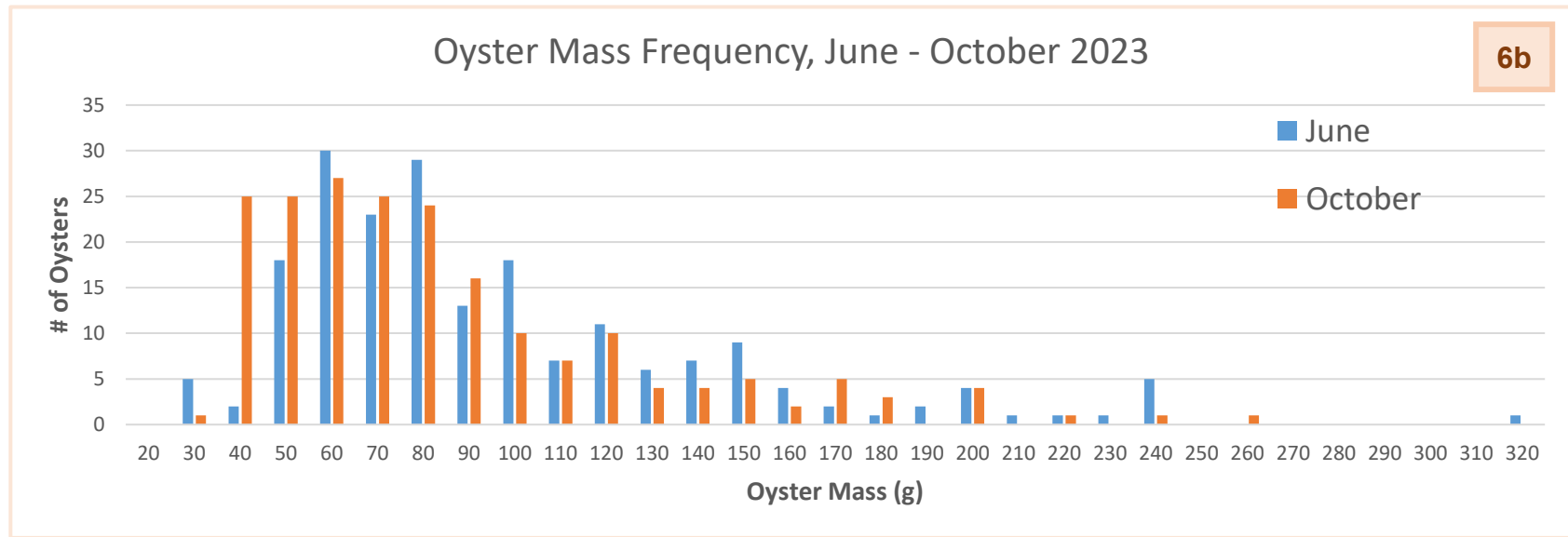
Fig. 4 | Fish eggs, likely skillettfish, found on an Eastern oyster shell.



Fig. 5 | A skillettfish using an oyster shell as habitat – a common sight in the oyster wraps each month.



Figs. 6a & 6b | Number of individual oysters at each size class of length (**6a**) and mass (**6b**) across all wraps at the beginning (June) and end (October) of the monitoring season. A handful of large clusters were excluded from mass data due to lack of individual oyster measurements.



Oyster Monitoring Volunteers 2023

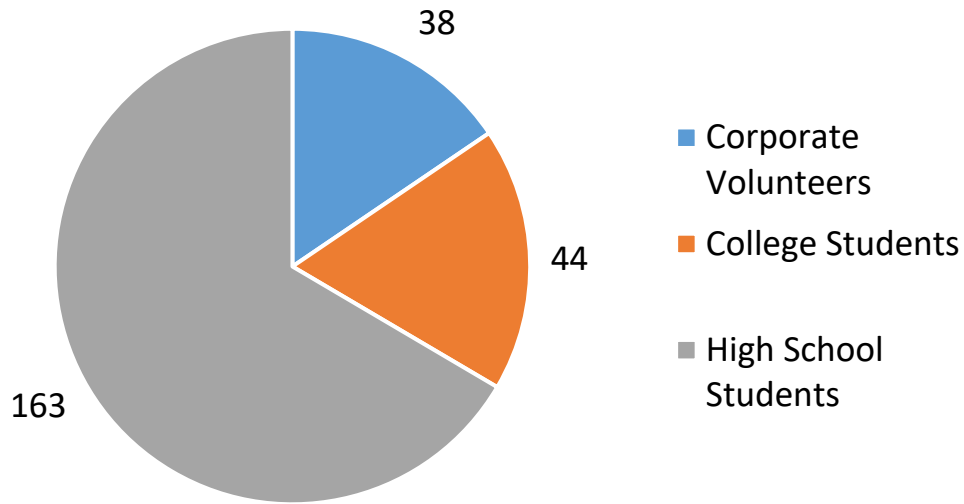


Fig. 7 | Counts of volunteer types engaged in the Community Oyster Project in 2023.



Fig. 8 | Oysters are rinsed and de-fouled in preparation for monitoring.

Fig. 9 | The Pier 32 pile field in which wraps are deployed.



Fig. 10 | Retrieval of wraps off a pile with a boat hook in June 2023.



Takeaways

Hudson River Park's Community Oyster Project demonstrated successful management and monitoring of adult oysters in the Pier 32 pile field.

Overall, oysters from both Fishers Island and the SOAR program have grown significantly since their respective deployments in 2018 & 2021. Though the oysters' growth has slowed, this is not unexpected after 2-3 years, after which growth rates tend to depress if the oysters survive (Harding 2020).

Fostering stewardship through citizen science is a core goal of the Park's Community Oyster Project. This season, 245 volunteers from corporate and student groups participated in oyster monitoring. Education through experiential science empowers community members to build positive environmental behaviors and cultivate Hudson River stewardship (**Fig. 7**).

Future Directions

Hudson River Park's Pier 32 oyster wraps will continue to be monitored as a part of the Tribeca Habitat Enhancement Monitoring Plan to assess the growth and retention of oysters in the Park's Estuarine Sanctuary. Further assessments such as spat counts, gonad condition index and potential genetic analysis to determine stock origin with the help of collaborating researchers are being explored by HRPK's River Project staff.

Mortality data collection methods will be expanded in future iterations of this project to better understand oyster mortality across all wraps throughout the season, rather than observing only within a subset.



Fig. 11 | Pulling oyster wrap onto Park research vessel in June 2023.

References

Connell, S. D. (2001) Urban structures as marine habitats: an experimental comparison of the composition and abundance of subtidal epibiota among pilings, pontoons and rocky reefs. *Mar Environ Res* 52:115–125

Harding, J. M. (2020) Observations on Age and Growth of the Eastern Oyster *Crassostrea virginica* in South Carolina Saltmarsh Tidal Creeks. *Journal of Shellfish Research* 39(3), 619-631. <https://doi.org/10.2983/035.039.0309>

McCann, M. (2018). *New York City Oyster Monitoring Report: 2016-2017*. The Nature Conservancy, New York, NY.