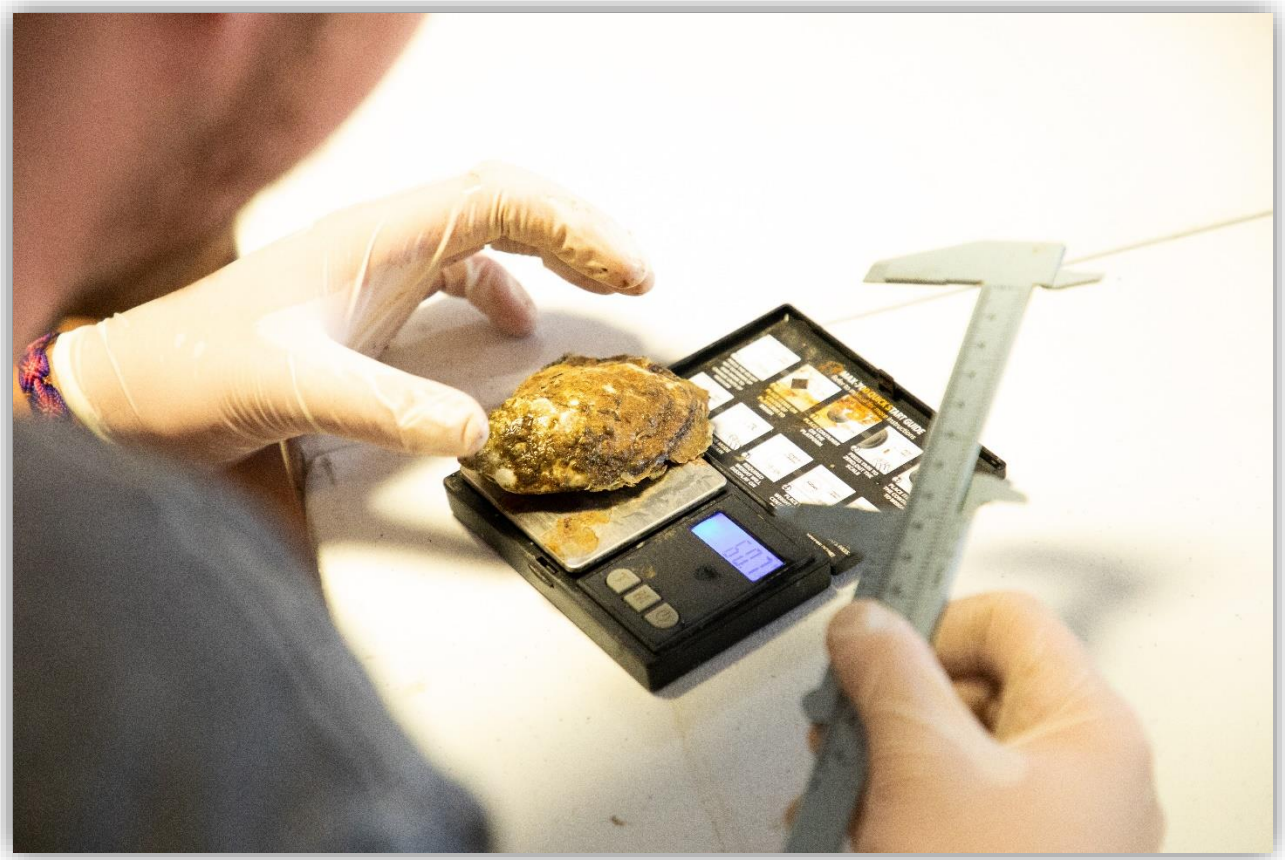
HUDSON RIVER PK
RIVER PROJECT

Community Oyster Project 2022



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Purpose

The Eastern oyster (*Crassostrea virginica*) is endemic to the Hudson River and once grew with great abundance; the oyster population today is less than 0.01% what it once was historically (McCann 2018). The Eastern oyster has many qualities that are valuable to preserving and improving the health of the River, including nutrient fixation and habitat engineering. For this reason, many groups (including the Park) are interested in enhancing the Hudson River's oyster populations. The Community Oyster Project, launched in 2017, reclaims pile structures to study oyster growth and mortality within Hudson River Park and assesses the potential of these sites as oyster habitat. The project confirmed research from other urban estuaries that suggested the viability of piles as habitat (Connell 2000). The success of and findings from this project led to the large-scale Tribeca Habitat Enhancement Project in 2021 and Gansevoort installation in 2022 for a combined deployment of 30 million baby oysters! The Community Oyster Project continues today to engage students, volunteers, and the public with hands-on field science wherein participants measure, weigh, and assess condition of oysters with the help of River Project staff.

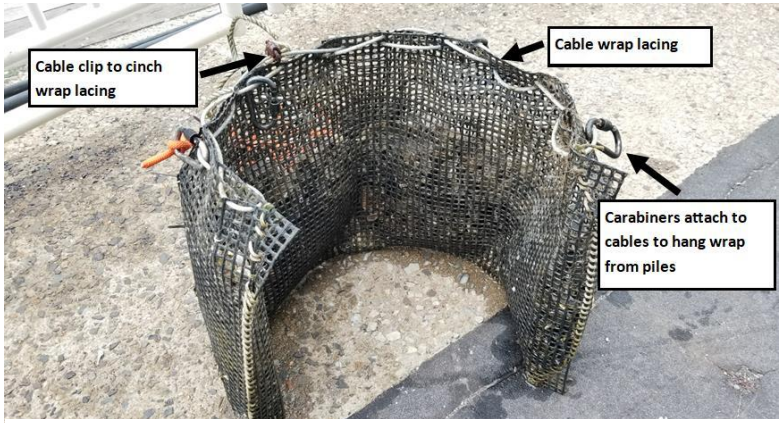

Fig. 1 | A standard oyster wrap with various components labeled.

Fig. 2 | Oyster wrap being deployed for winter in the Pier 32 pile field, November 2022.

Key Research Questions

- Is Hudson River Park's Pier 32 viable oyster habitat?
- How does oyster growth compare to previous monitoring seasons?
- How do new, younger oysters compare to original oysters?

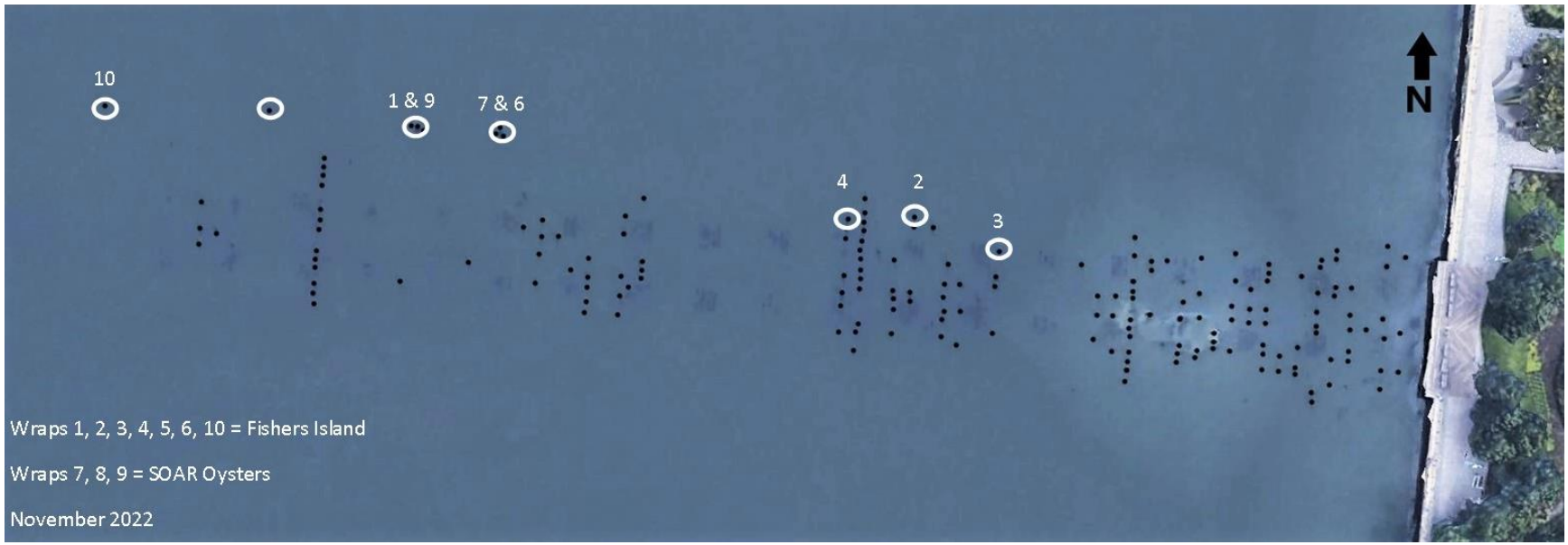

Fig. 3 | Satellite map of Pier 32 pile field; indicating oyster wrap placements in 2022.

Methods

- Oyster wraps are C-shaped enclosures made of marine-grade mesh, fastened by lacing PVC-coated steel cable through the mesh (**Fig. 1**).
- Ten wraps were deployed off wooden piles in the historic pile field at Pier 32, where they remain year-round.
    - Seven wraps were filled with adult oysters from Fishers Island in July of 2018. The other three wraps were filled with oysters from the Supporting Oyster Aquaculture and Restoration (SOAR) program in 2021.
- Half of the wraps were retrieved in the spring.
    - In 2022, retrieved wraps were numbers 3, 4, 6, 7 and 9.
- Of these, three wraps (3, 4 & 6) contained Fishers Island oysters and two wraps (7 & 9) contained SOAR oysters.
- Wraps were monitored monthly (June – October 2022) with the help of student and corporate volunteer groups.
- A random sample of fifty oysters from each wrap is observed each month, with each oyster determined to be alive or dead, then measured, weighed, and returned to the wrap.
    - Dead oysters, once measured, are broken in half so as not to be measured again at a later date.
- Wraps were returned to the pile field for overwintering in November 2022.
- Data were analyzed in Microsoft Excel.

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Major Findings

Growth

- While the Fishers Island oysters exhibit significant increases in length (+140%, $p<0.001$) and total mass (+273%, $p<0.001$) from 2018-2020, growth slowed significantly since 2020 and appeared negligible over the 2021-2022 season.

- By contrast, the younger SOAR oysters displayed significant increases in length (+30%, $p<0.001$) and mass (+246%, $p<0.001$) from 2021 to 2022

- Across all wraps from June-October 2022, average length increased by 3mm ($p=0.03$) (**Fig. 6a**), and average mass by a whopping 30g, or 50% of average starting mass ($p<0.01$) (**Fig. 6b**)

Mortality

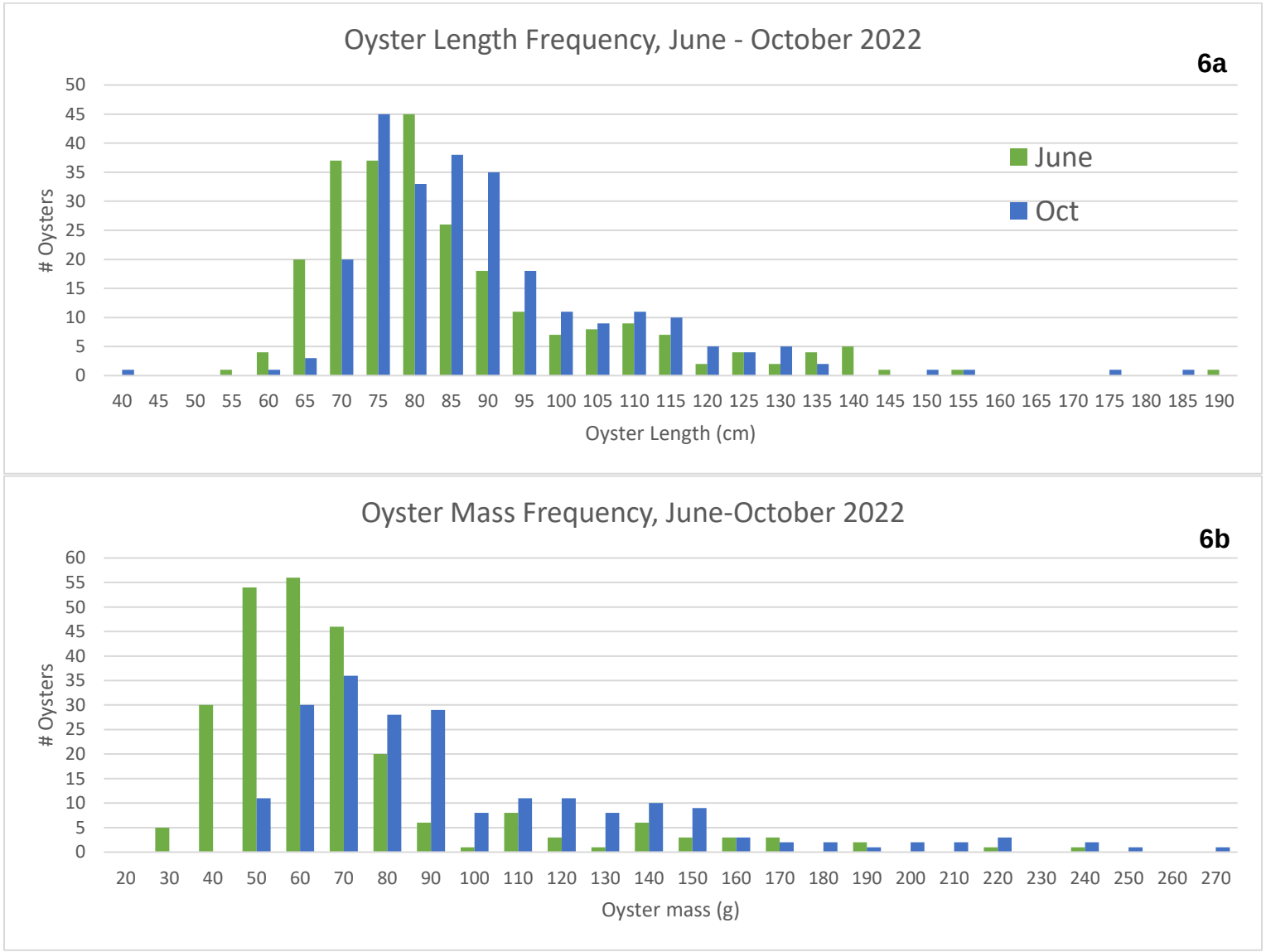
- Oyster wrap subsets (~50 individuals) experienced a highly variable 4-26% mortality each month.

Supported Species

- A variety of mobile species were observed inside the wraps including as oyster toadfish (*Opsanus tau*) (**Fig. 5**), skilletfish (*Gobiesox strumosus*), 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 | An Eastern oyster in a volunteer's hand.

Fig. 5 | A juvenile oyster toadfish – 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.

Fig. 7 | The Pier 32 pile field in which wraps are deployed.

Fig. 9 | Oysters are rinsed and de-fouled in preparation for monitoring.

Fig. 8 | Hudson River Park's vessel used to retrieve and deploy oyster wraps.

Fig. 10 | Hudson River Park staff train high school volunteers in monitoring.

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 and even over just the summer and fall of 2022. Though Fishers Island oysters' growth has slowed, this is not unexpected after the 2-year mark, 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, over 110 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. 11 | Hudson River Park staff scrub an oyster cage during volunteer monitoring in the 2022 season.

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.

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.