HUDSON RIVER PK
RIVER PROJECT

Community Oyster Project 2021

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Purpose

The Community Oyster Project, launched in Hudson River Park in 2017, is an oyster research project that reclaims piling structures to study oyster growth and reproduction within Hudson River Park and assesses the potential of these sites as oyster habitat. Research in other urban estuaries has found that piling structures can support assemblages of life similar to those around rocky reef habitat (Connell 2000). Through the development and installation of oyster wraps - marine-grade mesh enclosures filled with oysters and secured to pilings in Hudson River Park's Pier 32 piling field - the Park is engaging the community in studying the strength of this restoration technique. 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 successfully restoring the Hudson River's oyster population.

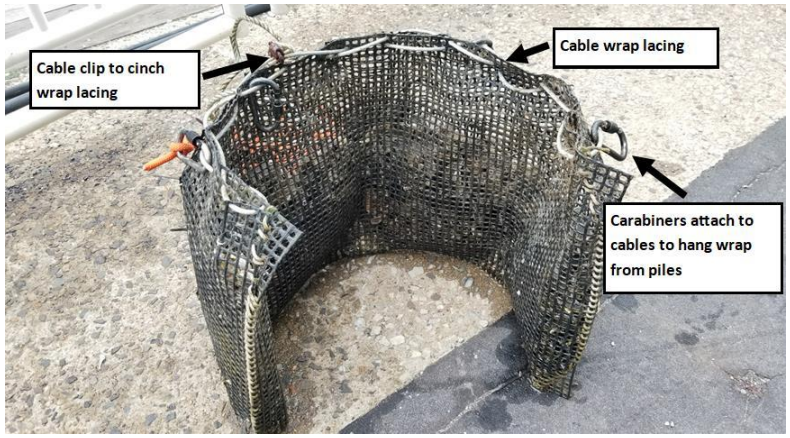


Fig. 1 | A standard oyster wrap with various components labeled

Fig. 2 | Oyster wrap on a pile in deployment process.

Key Research Questions

- Do oysters increase in size and weight when they are wrapped around piles at Hudson River Park's Pier 32?
- How do mortality and growth rates compare to previous monitoring seasons?
- How do new, younger oysters compare to original oysters from 2018?

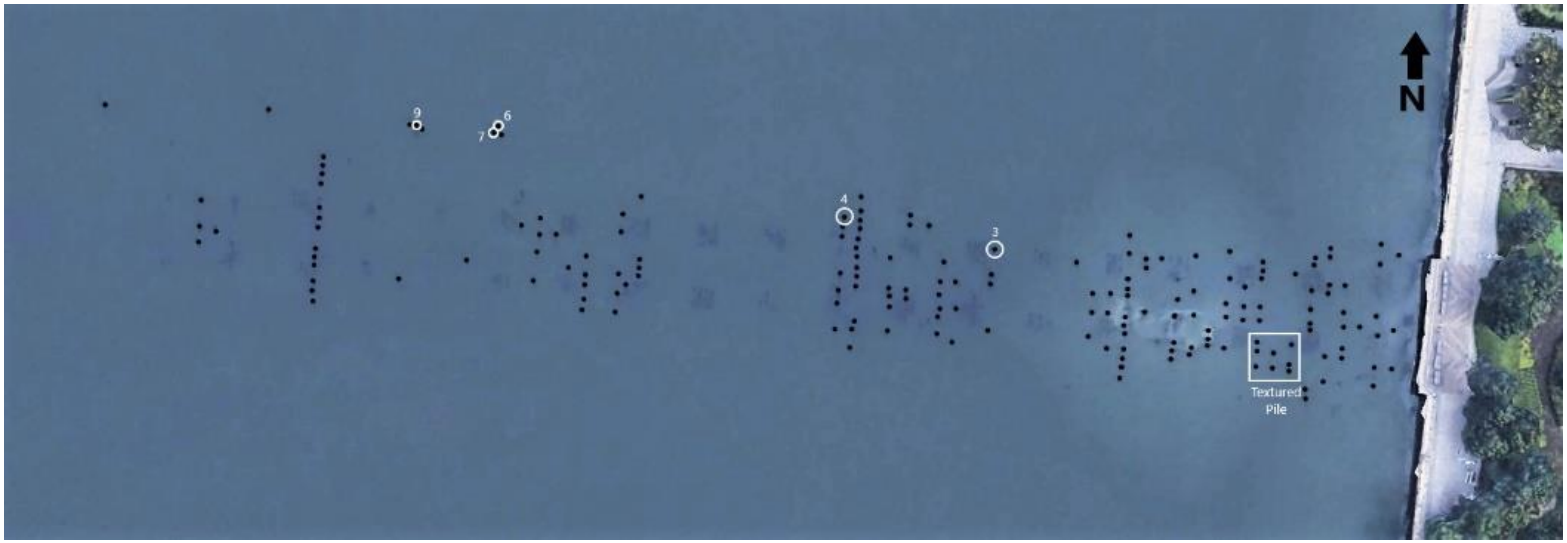


Fig. 3 | Aerial Map of Pier 32 pile field; indicates the oyster wraps monitored in 2021.

Methods

- Oyster wraps are C-shaped enclosures made of marine-grade mesh. They are sealed by lacing steel cable through the mesh and attached via rope clip (Fig. 1).
- 6 wraps were filled with adult oysters from Fisher's Island in July of 2018. This year, 3 new wraps were created and filled with oysters from the SOAR Program (Supporting Oyster Aquaculture and Restoration), an effort that developed during the COVID-19 pandemic to return to a total of 10 wraps in the pile field.
- 3 wraps (wraps 3, 4 & 6) containing Fishers Island oysters and 2 wraps containing SOAR oysters (wraps 7 & 9) were retrieved from the pile field (Fig. 3) and monitored monthly during the field season (July-October 2021), before being returned for winter. This ensured half the total number of wraps were monitored, while the other half remained in the pile field.
- Park staff along with community volunteers collected data for the 5 wraps each month.
- Each wrap was filled with 150 adult oysters. 75 tagged oysters from each wrap were randomly monitored to record length (mm) and weight (g). The wraps were scrubbed as needed to reduce bio-fouling and maintain the flow of water and plankton to the oysters.
- Data were analyzed in Microsoft Excel.

Major Findings

Wraps 3, 4 & 6

- Growth rate in the 3 original (Fishers Island oyster) wraps from 2018 has slowed over time, with a particularly sharp drop in this 3rd year, with average length increasing by 14mm in 2019, 10.5mm in 2020, and 0.7mm in 2021 (Fig. 4).
- Oyster weight exhibited a highly similar pattern, with an average increase of 29.5g in 2019, 24.6g in 2020, and 1.3g in 2021.
- Oyster mortality rates increased over time, with 9.8% of oysters monitored dead in 2019, jumping up to 40.3% in 2021.

Wraps 7 & 9

- The new (SOAR oyster) wraps exhibited similar growth rates to those of the original wraps in their first year: an average 12mm length increase, and 23.3g mass increase over the course of the 2021 season (Figs 6a &6b).
- The SOAR wraps therefore did not exhibit the same depressed growth rates that were observed in the Fisher's island wraps.
- So far, within the season, SOAR oysters exhibited only ~1% mortality, though most die-offs occur during the winter months, so mortality rates will be able to be more thoroughly analyzed and compared next season.

General

- 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*) and mud crabs (*Panopeus & Rhithropanopeus sp.*).
- Many sessile organisms were also found encrusting the oyster shells, including sponges, barnacles, polychaetes, and others.
- In sum, these observations highlight the key role oysters play in providing habitat for myriad mobile and sessile species alike.

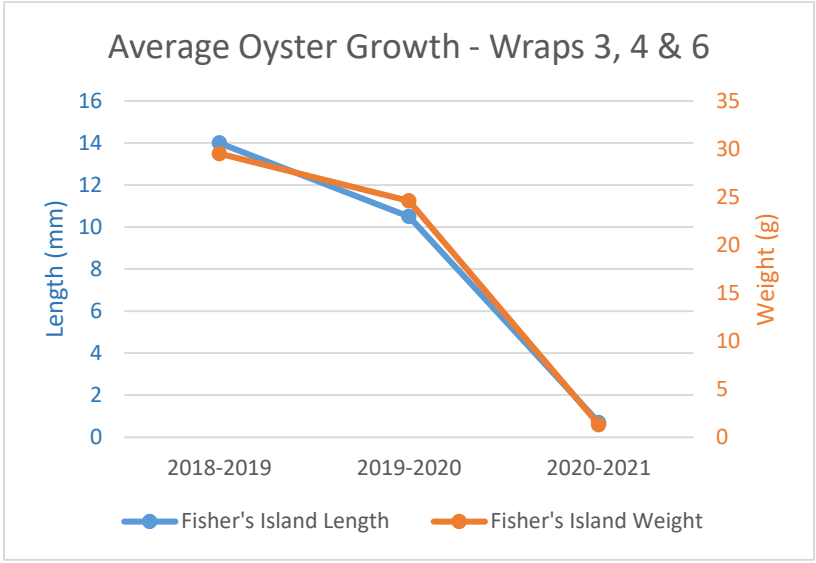
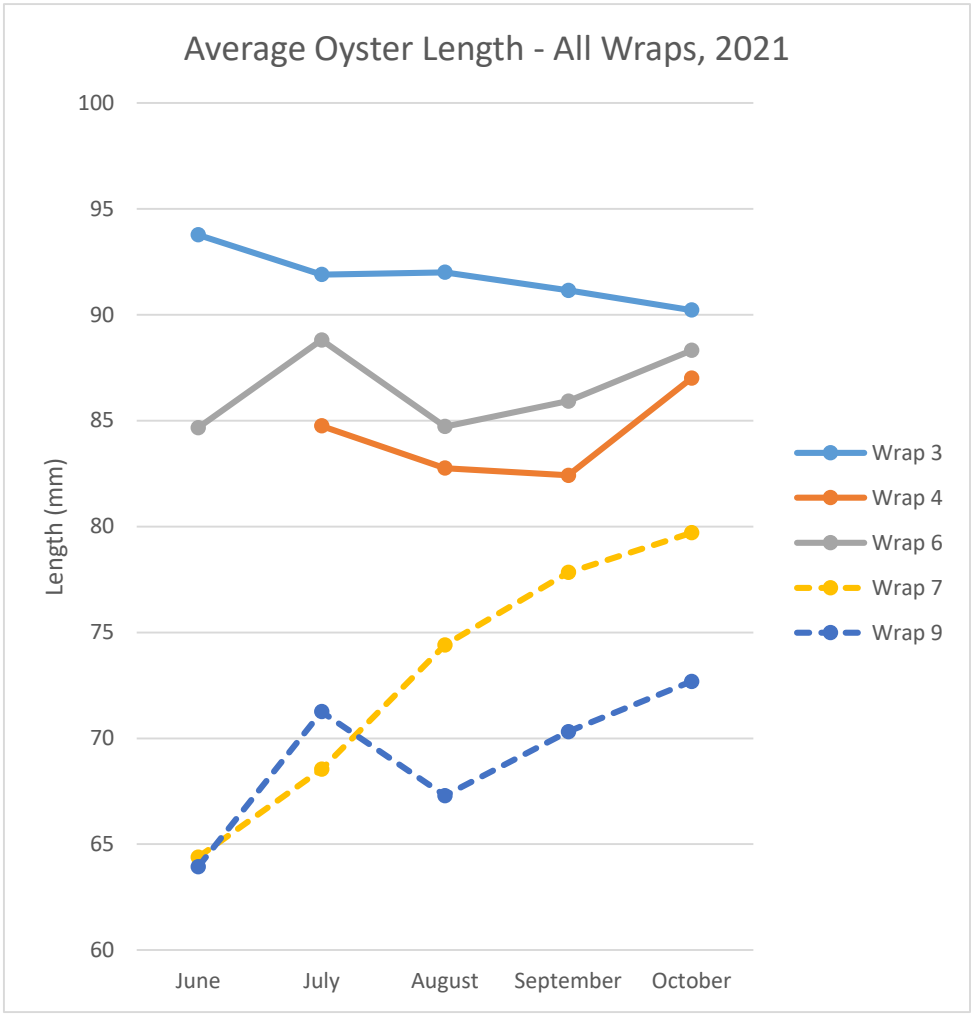
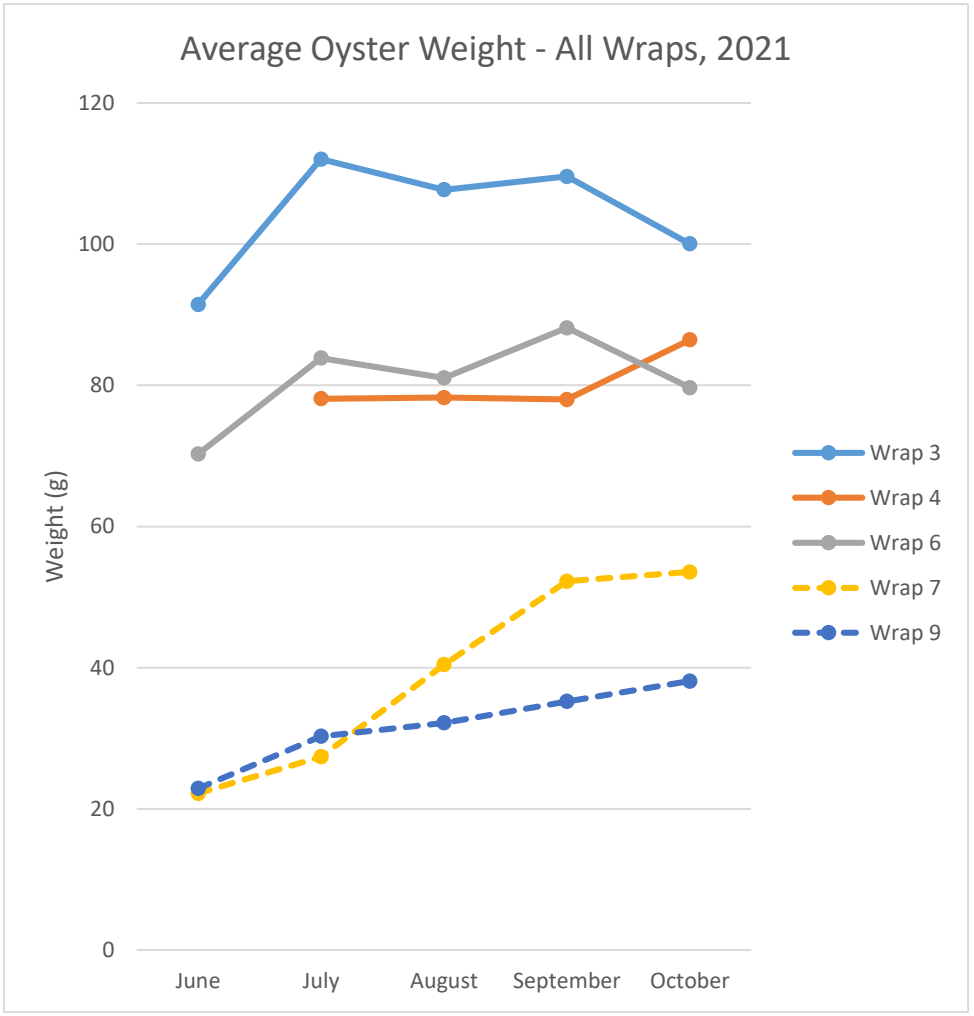


Fig. 4 | Average length and weight increases each year in original Fisher's Island oyster wraps.

Fig. 5 | A juvenile oyster toadfish – a common sight in the oyster wraps each month.





Figs. 6a & 6b | Monthly growth of oysters in all 5 wraps, 2021. Fishers Island oysters are denoted by solid lines, while new SOAR oysters are denoted by hashed lines. Some declines in measurements between months may be due to either mortality or differences in the individual oysters randomly selected that month.

Take Aways

Hudson River Park's Community Oyster Project at Pier 32 demonstrated successful growth of adult oysters between 2018 and 2020. With the conclusion of the 3-year pilot, the wrap monitoring was "reset" in 2021, with the addition of fresh SOAR oysters in new wraps.

The slowing of 3+ year-old oyster growth rates is not unexpected, as it has been shown that Eastern oysters' growth slows after age two or three (Herbert & Steponaitis 1998). The fact that the new, young oysters did not exhibit depressed rates, but rather ones comparable to those observed in 2018 is encouraging, and suggest that it is the age of the oysters rather than the physical conditions that have caused this shift.

In all, it is clear that, despite varying degrees of mortality, oysters grow quite well in the pile fields of the Park.

Over 40 individuals safely participated in socially distanced, oyster-focused Park programs in the summer of 2021. These participants included college classes, corporate volunteers, and the general public. Hudson River Park will continue to engage the New York City community in educational ecological restoration programs that meaningfully add to local estuarine data sets.

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 potentially genetic analysis to determine stock origin, are being explored by HRPK River Project staff, with the expectation of assessment commencing in 2022, exact methods to be determined.

Fig. 7 | Community volunteers measuring oysters during one of the volunteer events in the summer/fall of 2021.

References:

Connell SD (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

McCann, Mike. 2018. New York City Oyster Monitoring Report: 2016-2017. The Nature Conservancy, New York, NY.