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Long Island oyster hatchery gets creative to restore once-thriving reefs

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Taylor Larson, an educator at Seatuck Environmental Association, releases juvenile oysters, or spat, into the Great South Bay to form an oyster reef last month. Credit: Newsday/Steve Pfost

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Christina LoBuglio, the manager at Seatuck Environmental Association's new oyster hatchery in West Sayville, lifted a heavy mesh bag packed with oyster shells and tipped it over the side of a boat and into the shallow water of the Great South Bay.

A dozen or so juvenile oysters, called spat, were lodged on the smooth inner surface of each half shell, all of them nurtured for the past four months in the carefully controlled conditions of LoBuglio's laboratory tanks.

LoBuglio hopes that this prolonged time in the hatchery will give her oysters an advantage now that they are fending for themselves. Some young oysters in

other restoration projects have been released at just 2 to 4 millimeters in diameter (about the size of a peppercorn), but these spat were larger, about 15 millimeters (roughly the width of a knob on a Lego block). Next season, the hatchery will let them grow even larger, to about 25 millimeters, before setting them out.

"It takes a lot of time, and it costs money to do that," said Kris Mielenhausen, conservation director at the Seatuck Environmental Association. "But the larger they are, the more defense they're going to have against predation."

WHAT NEWSDAY FOUND

- **A new oyster restoration project** in the Great South Bay is testing new techniques to improve survival rates of the young oysters.
- **Ecologists at Seatuck Environmental Association**, which launched the program, are focused especially on helping the young shellfish to better defend themselves against predators, a significant cause of mortality in past restoration efforts.
- **The long-term goal is to establish** a functioning reef, which can help clean water, increase biodiversity and soften the impact of waves on eroding shorelines.

For the past 40 years, ecologists have been working to recreate some version of the vast oyster reefs that once flourished along the U.S. coastlines, from the Gulf of Mexico to the Gulf of Maine. In Long Island's bays and estuaries, those efforts stretch back at least 25 years.

But those projects have not often succeeded. "A lot of the restoration, unfortunately, and it pains me to say it, isn't working," Mielenhausen said. They aren't reaching "that critical mass" that's required for the shellfish to begin multiplying naturally.

So Seatuck set out to try something different for its new restoration project in the Great South Bay. In particular, they will be testing several strategies to help the newly released spat to resist predators — often a significant source of mortality.

"It’s a scientific experiment," Mielenhausen said as he leaned against the gunwale of a boat in the bay. "It's about looking at the data, and being honest about the successes and the failures." And when there are failures, the ecologists will be asking, "what we can we do to make it work?"

Healthy reefs, healthy ecosystems

Oysters were once so plentiful and so cheap on the Eastern Seaboard that they became a popular tavern food in colonial and early industrial America, not a delicacy for the elite. But by the late 19th century, severe overharvesting led to a collapse of oyster populations.

Oysters are considered a keystone species, so when the shellfish disappeared, coastal ecosystems also suffered. They consume excess algae, nitrogen and bacteria as they feed, making the water more hospitable to marine plants and animals. Healthy reefs shelter small fish and invertebrates and soften the force of waves on sea grass beds and eroding shorelines — all of which made oysters ideal partners in ecologists’ efforts to revive degraded marine ecosystems.

The reasons some of those efforts have failed are varied. The tiny oysters may become an easy meal for predators. Heavy waves can bury them in silt or sweep them away before the shells have grown fused together. Oysters do best in brackish waters; if the salinity is too high, they often struggle to reproduce. Nitrogen pollution from nearby wastewater sources can starve the shellfish of oxygen.

"There are so many challenges in an urban estuary," said Meredith Comi, a biologist who works on oyster restoration at Monmouth University’s Urban Coast Initiative in New Jersey.



Juvenile oysters, or spat, are lodged on the smooth inner surface of each half shell and nurtured in lab tanks before being released into the Great South Bay. Credit: Newsday/Steve Pfost

Boosting oysters' defenses

More bags were tipped over the side, and in short order, some 800,000 juvenile oysters had tumbled to the sandy floor of the bay.

LoBuglio tested the water for temperature, dissolved oxygen, salinity and pH levels, declaring the conditions to be excellent for her oysters. If all goes well, these spat will wait out the winter in a dormant state and begin to feed and grow again in spring.

In the meantime, Seatuck will be experimenting with another technique to give their oysters a good start. In some previous projects, nearly 90% of the young oysters have been eaten by other marine animals. But a recent study found that oysters that were raised with caged blue crabs — a common oyster predator — grew shells that were 50% tougher than the control group. Once released after eight weeks, they had 300% higher survival rates.

With that study in mind, Seatuck hung oyster cages from a dock in the Great South Bay last summer, and watched to see what predators would show up. Fellows with the group's ISLE program (Introducing Students to Long Island's Estuaries) monitored the cages and soon identified the local predators: blue crabs, mud crabs and oyster drills — small snails that bore pinprick holes in an oyster shell and devour the animal inside.

This winter, back at the hatchery, those predators will be added to the juvenile oysters' tank, safely separated but close enough that they might prompt the tiny shellfish to build up their armor. Scientists call it a predator cue experiment. If it works, the oysters released next fall may be not just larger but tougher.

The hatchery is funded by the Knapp-Swezey Foundation, based in Patchogue, and other private donors, and Seatuck has applied for a state grant through the South Shore Estuary Reserve program to support the predator cue research.

One day, Seatuck hopes there will again be thriving, self-sustaining oyster reefs in the Great South Bay — dense colonies of living shellfish and older shells, a nursery for marine life. "We're pretty far away from that at this point," Mielenhausen admitted. Eventually, he said, "maybe we can get to a place where we can actually restore populations." In the meantime, there will likely be years of trials, errors, and more trials.

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