ABSTRACT

Oyster reefs have been documented to provide valuable habitat structure and ecosystem services as well as socioeconomic benefits. Native reefs once dominated many estuaries ecologically and economically. Studies have shown depletion and degradation of oyster reefs worldwide. Successful restoration efforts have further demonstrated the value of oyster reefs to coastal ecosystems and communities.

Reef Ball™ Modules (RBM’s) are designed to mimic natural bottom structure and are being used to address a variety of environmental concerns. Initial investigations suggest that these artificial reefs may have far reaching effects in habitat and species restoration efforts including: designing and growing artificial reefs, coral propagation and planting systems, estuary restoration, mangrove plantings, erosion control, and oyster reef restoration.

In 2018 students and faculty at the Sound School built five Mini-Bay RBM’s (width: 0.57m, height: 0.53m, weight: 91kg) using oyster shell as a cement additive. In May 2018 the aquaculture laboratory at the school successfully spawned oysters. After the spawners three RBM’s were placed in a set-tank with 20μm spa. The RBM’s soaked for ten days. In June 2018 the RBM’s, three with set and two unseeded, were deployed in near shore waters by the school campus. This process was repeated in 2019 with the construction of eight additional RBM’s. Six were seeded with spat and all eight were deployed expanding the reef.

To date all modules with oyster set demonstrated successful oyster growth and survival over 50% of the surface. Additional recruitment from wild oyster set was documented. A variety of crab and fish species were observed using the RBM’s. Oyster growth and recruitment, water quality, and biodiversity continue to be monitored.

THE SOUND SCHOOL

The Sound School is a Regional Vocational Aquaculture Center located on ¼ mile shorefront campus in New Haven, CT. The student body averages 340 students, half from New Haven and the other half from 23 cooperating districts. The school’s unique curriculum focuses on marine trades and aquaculture with an emphasis on authentic and hands-on learning experiences.

REEF BALL CONSTRUCTION

Sound School students successfully built five Mini-Bay RBM’s during the 2017-18 school year using a donated mold from the Reef Ball Foundation and oyster shell as an additive in a customized cement mix.

During the 2018-2019 school year students refined the construction process incorporating up-to-date techniques and methods to successfully build eight additional RBM’s. Most notably, the mold was sprayed with a sucrose solution to increase surface texture on the RBM.

OYSTER SET

In May RBM’s (3 in 2018, 6 in 2019) were placed in 1677L set tanks and conditioned with a diluted vétérage soak, followed by two sea water soaks over the course of two weeks. RBM’s then remained in tanks for ten days with 20μm spa which were fed algae monocolores.

DEPLOYMENT

Over the past two years thirteen RBM’s were deployed, nine seeded with lab cultured oyster set and four without set. The site was chosen for its accessibility for monitoring, proximity to a small marsh, and bottom firmness.

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NOTABLE RESULTS

- Over 50% oyster coverage on all seeded RBM’s
- Higher set survival and oyster survival in tanks and interior of RBM’s
- Recruitment from wild oyster spine observed on both seeded and control RBM’s
- Variety of fish and invertebrate species have been observed utilizing structures
- Blue crab mating events within RBM’s were observed and recorded
- RBM’s seeded with lab cultured oyster set annually
- “Living Laboratory”
- Continued monitoring and development of student research projects
- Habitat use and fish behavior
- Marsh growth
- Sedimentation
- Scientific dive training to support monitoring efforts
- Obtain CT DEEP Certificate of Permission for permanent deployment
- Expansion of oyster reef into living shoreline over the next 10 years
- Construction and deployment of 12 RBM’s annually
- 6 RBM’s seeded with lab cultured oyster set annually
- CT Scuba Academy
- Reef Innovations
- Reef Ball Foundation
- New Haven Land Trust
- Long Island Community Foundation
- Yale University School of Forestry and Environmental Science
- Sacred Heart University
- L. Stowe Concrete
- Home Depot
- Diver Alert Network
- NOAA Marine Fishery-Milford Lab
- Stuart Mattison and the Sound School fish lab staff and students

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