

# 2021 OYSTER CONSERVATIONIST PROGRAM FINAL REPORT



# 2021 Oyster Conservationist Program

## FINAL REPORT

October, 2021

Adeline McCullough<sup>1</sup>, Brianna Group<sup>1</sup>

<sup>1</sup>The Nature Conservancy New Hampshire Chapter, Concord, NH 03301, Brianna.group@tnc.org

### Introduction

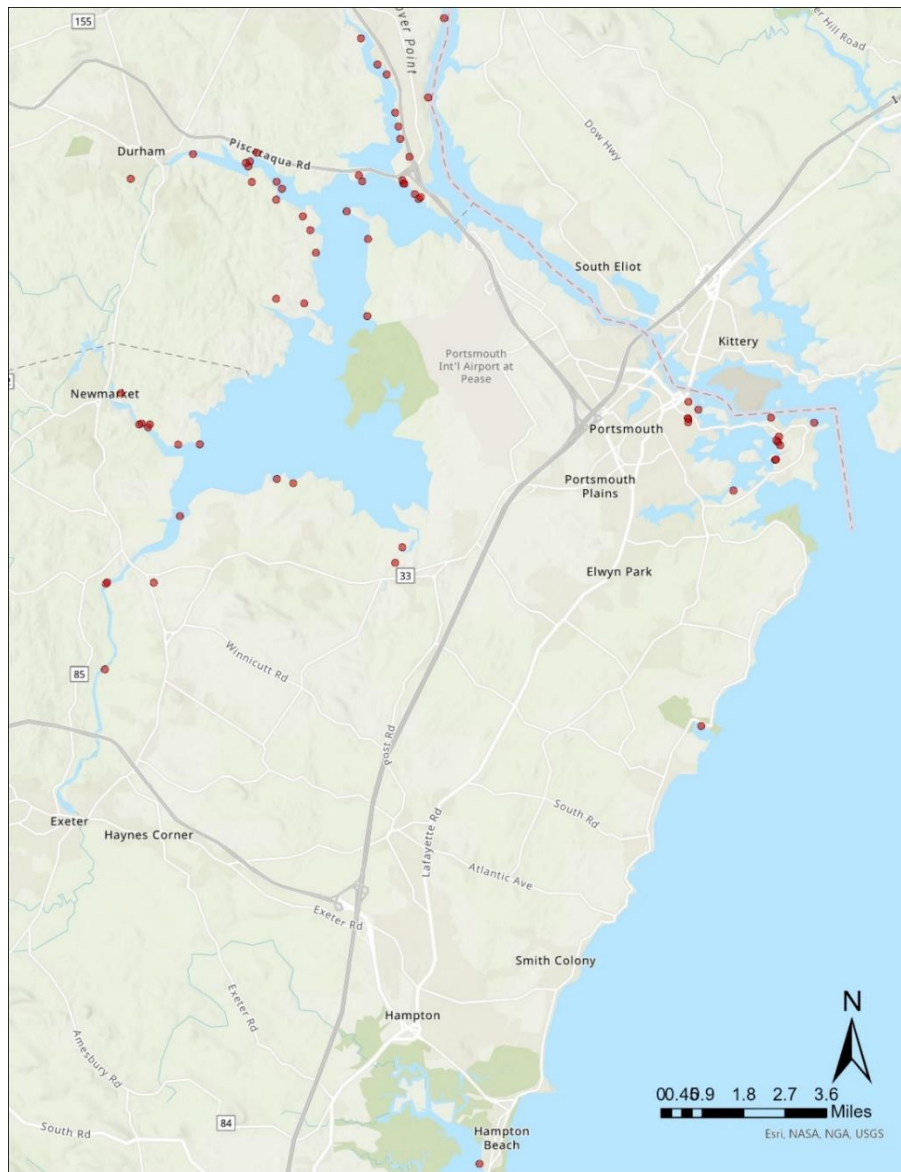
The eastern oyster, *Crassostrea virginica*, is an important keystone species in the Great Bay Estuary, NH. As an ecosystem engineer, oysters provide several ecosystem services to both people and wildlife. Oysters filter excess nutrients and suspended solids from the water column improving water quality and clarity (Coen et al., 2007). In addition, oyster reefs provide important habitat for fish and invertebrates by building large vertical complex reef structures (Coen et al., 2007). Historically, Great Bay Estuary was filled with acres of healthy oyster reef. However, due to pollution, disease, sedimentation, and historical harvesting these numbers have decreased by over 90% resulting in only a little over a 100 acres of oyster reef today. With this drastic loss of oyster reefs, Great Bay has experienced a similar loss in the important ecosystem services that oysters provide to estuarine ecosystems. For this reason, The Nature Conservancy (TNC) of New Hampshire has been working collaboratively with The University of New Hampshire's Jackson Estuarine Laboratory (UNH-JEL) to restore oyster reefs to Great Bay since 2009. The Oyster Conservationist (OC) Program is an important community engagement component of oyster reef restoration in Great Bay.

An Oyster Conservationist is a community member in the coastal area of New Hampshire who advocates or acts for the protection and preservation of the environment and wildlife. Participants in the OC Program work towards improving the health of Great Bay by raising oyster spat for TNC's oyster reef restoration projects. Volunteers adopt a cage with spat on shell for an eight-week period cleaning and caring for the cage while also collecting data throughout the summer on survival, growth, invasive species, and wild oyster spat settlement. In 2020, the OC program had participants at 61 sites in New Hampshire. Spatially these sites are located across Great Bay, Little Bay, Piscataqua River, coastal NH, and its seven tributaries (Figure 1). The data collected provides information on conditions for oyster growth, survival, and wild oyster spat settlement to inform future oyster restoration efforts in Great Bay Estuary. In 2020, the OC Program was modified for the impacts of COVID-19. Those changes are described below. We are thankful for the volunteers who continued to be a part of the program and to be flexible and adaptable to the many changes that were implemented to ensure safety while participating in our OC Program to raise oysters for restoration.

## Methods

### *Recruitment and Training*

70 OC volunteer sites in 2021 spanned across 11 towns in NH: Dover, Durham, Greenland, Newington, Stratham, Portsmouth, Newcastle, Rye, Newmarket, Newfields, Hampton, (Figure 1). Durham's Community Oyster Garden was also started this year, which housed 4 oyster cages. Updated Covid-19 policies and higher capacity allowed for new recruitment for the 2021 season. There were 7 new sites this year in Greenland, Portsmouth, Newmarket, Durham TNC's Coastal Conservation Coordinator Brianna Group, along with Coastal Restoration Intern Adeline McCullough were available throughout the season to answer questions and provide feedback to volunteers as needed.



**Figure 1.** Map of general locations of Oyster Conservationist sites in coastal NH.

## ***Oyster Spat Production***

### *Permitting*

The Nature Conservancy acquired the permits required for the Oyster Conservationist Program from New Hampshire Department of Fish and Game (Permit # MFD 2134) for growing oyster spat at OC sites in accordance with state shellfish regulations.

### *Shell collection and preparation*

Recycled oyster shell was collected from local restaurants in NH and ME through the UNH Shell Recycling Program and Coastal Conservation Association, then quarantined for the necessary amount of time before being used. This recycled oyster shell was used to fill 128 UNH cages 1/2 to 2/3 full at the University of New Hampshire's Jackson Estuarine Laboratory (JEL) in May. Once filled, the cages were placed in 3 remote setting tanks at JEL. The 70 Oyster Conservationist cages were cleaned and repaired in preparation for the 2021 season.

### *Spat-On-Shell Production*

Remote-setting of larvae occurred at JEL in Durham, New Hampshire under the supervision of Dr. Ray Grizzle and Krystin Ward. Ten million larvae were purchased from Muscongus Bay in Bremen, ME and arrived via FedEx on July 16<sup>th</sup>, 2 weeks later than usually received in past years. Krystin and Dr. Grizzle measured out and divided larvae between the four setting tanks based on tank capacity. During this process Dr. Grizzle and Krystin monitored spat settlement, water quality, and maintained notes on the process. Larvae settled on the oyster shells within a few days to produce live spat-on-shell. On July 20<sup>th</sup>, cages were moved from the four tanks to the floating nursery raft at Adams Point for further growth until spat counting.

The usual spat counting week was cancelled due to COVID-19 restrictions. TNC staff counted shells and spat-on-shell on 30 random oyster shells for an initial data point for each Oyster Conservationist cage before delivery. Volunteers of Oyster workshops at the Durham Community Oyster Garden also helped count initial data. Then staff helped with prepping cages before delivery.

### ***Program Delivery***

Once Oyster Conservationist cages were prepped and counted, TNC staff distributed the cages to each OC site. Each site received a caliper, brush, permit (through email), informational materials, and a datasheet. New volunteers received one on one training during cage deliveries on cage management, data collection, oyster ecology, and restoration efforts. OC cages contained 50 recycled shells (mainly oyster with some clam shells) with live spat-on-shell and a bait bag with only oyster shell. Depending on each site, some volunteers also received a float, extra rope, or screw anchor if needed. Since the larvae were delivered 2 weeks later than expected, the season was about six weeks, with volunteers collecting data on August 23<sup>rd</sup> and September 13<sup>th</sup>. OC volunteers measured 30 random spat and counted spat on 30 random

recycled oyster shells. Similarly, OC's monitored invasive species, predators, fouling agents, and wild spat (on the oyster shell in the bait bag). In addition, OC's were asked to check on the cage weekly and to clean it to ensure water flow. Both the Coastal Conservation Coordinator Brianna Group and Coastal Restoration Intern Adeline McCullough was available to answer questions during this period. In late September-early October, both the Coastal Coordinator and Coastal Restoration Intern picked up the OC cages and materials. TNC staff helped with the spat counts and measurements at the end of the season.

Once the cages were counted and measured, they were condensed by town into fish totes. Storms delayed the deployment of the oysters by more than a week. November 3<sup>rd</sup>, TNC and JEL staff deployed the oysters grown by the Oyster Conservationist Program on a shell pile at the oyster restoration site at Woodman Point in Great Bay (Figure 2). This marked the end of the 2021 Oyster Conservationist Season.



**Figure 2.** Map of Great Bay Estuary showing The Nature Conservancy's oyster reef restoration sites (red=historical restoration sites and blue circles =current restoration sites). Oysters grown by Oyster Conservationists in 2021 were placed on the oyster restoration site at Woodman Point on November 3<sup>rd</sup> (WP, blue circle).

## Results

### *Initial Spat*

Oyster spat were counted in July by TNC and JEL staff before delivery to the OC volunteers for an initial count. Spat were visible, but too small to measure (<5 mm). Initial spat per shell varied with a range of 0-277 oyster spat per shell and an overall average of 34.05 spat per shell  $\pm$  0.67 (mean  $\pm$  standard error) (Figure 3).

TNC delivered an estimated 110,664 oyster spat to the Oyster Conservationist volunteers in early August. OC's measured and counted their oyster spat twice throughout the 8 week-period.

Tank	Average spat per shell $\pm$ SE
A	21.41 $\pm$ 0.86
C	28.12 $\pm$ 0.76
D	48.38 $\pm$ 1.36

**Figure 3.** Average spat per shell by remote setting tank from initial counts in late July. OC's didn't receive any oysters from tank B.

### *Growth*

Average growth (measured as average shell length in mm at the end of the OC season) across all sites was 19.02  $\pm$  0.21 mm (mean  $\pm$  standard error). The ending size of spat ranged from 4 mm to 65 mm. The largest spat shell length recorded was 65 mm.

### *Survival*

Oyster Conservationists were given an estimated 110,674 oyster spat in August and returned an estimated total of 55,284 oyster spat in September with an overall 49.96% survival rate. While survival appears low compared to other years, we saw an incredibly high initial settlement of oyster spat and expected a percentage of mortality due to space competition. 2021 was the third highest year in terms of number of oyster spat grown in the OC program.

### *Discussion*

The Oyster Conservationist Program successfully met its goal to: raise oysters for restoration, collect important data on growth and survival of oysters at sites across the Great Bay estuary, and to create environmental stewards that advocate or act for the protection and preservation of the environment and wildlife. Volunteers in our OC Program raised 55,284 oyster SOS for reef restoration in 2021. As of 2006, the OC Program has raised approximately 335,700 juvenile oysters for reef restoration cumulatively. Volunteers successfully collected important data on growth, survival, wild spat, fouling organisms and predators for their sites. And finally with 70 sites and a community oyster garden in Durham we have successfully met our goal to create environmental stewards that advocate or act for the protection and preservation of the environment and wildlife. Through the OC Program we have engaged with over 200 volunteers around the importance and connection between oysters and our beautiful Great Bay estuary.

## **Thank you & Acknowledgements**

The Nature Conservancy would like to thank the following organizations for participating in 2021 oyster restoration activities in Great Bay: University of New Hampshire Jackson Estuarine Laboratory's Dr. Ray Grizzle and Krystin Ward, Coastal Conservation Association, New Hampshire Sea Grant Program, Nature Groupie, The Gundalow Company, and the dedicated team of Oyster Conservationist volunteers.

## **Works Cited**

Coen, Loren D., et al. "Ecosystem services related to oyster restoration." *Marine Ecology Progress Series* 341 (2007): 303-307.