

Instructions

QUINNIPIAC RIVER FUND GRANT AWARD - FINAL REPORT QUESTIONS

This form is to be completed by all nonprofit organizations that received a grant through the Quinnipiac River Fund.

Grant Details

Grant Details

Organization Name

University of Connecticut

Grant Description

to support the measurement of water quality parameters, as well as assess the condition of resident oysters in the Quinnipiac River and neighboring Morris Creek ecosystems.

Total Grant Amount

20,000.00

Report Questions

1. List the specific objectives/outcomes of the project and tell how they were met during the grant period. Also, provide an update on any special conditions of the grant (if applicable).

Re Objective 1): We purchased and deployed equipment to monitor water. The data generated by our team illustrates the differences between the Quinnipiac River (QR) and Morris Creek (MC), near the bottom, as relevant to oysters. Dissolved oxygen and temperature represent a complete data record and show that differences in amplitudes of these parameters are driven by the tidal cycle and are larger in MC than in the QR. MC is smaller and shallower than the QR. During very low tides, much of the bottom is exposed to air, with small indentations and the channel always submerged. The degree of fluctuation in water parameters is important to realize when considering the environmental context for oysters. The two study sites host oysters that reproduce annually and can build complex architectures called reefs. The presence and possibility of oyster reef formation speak to the high suitability of these sites for sustainable oysters. Having the water parameter data in hand, we will be able to share it with different audiences in Long Island Sound watershed, which can use that information to advance their pursuits, whether restoration or diverse research, or yet to realize any overtime changes that the two ecosystems may experience.

Re Objective 2): Based on monitoring of oyster concentrations, by using 0.25 m x 0.25 m quadrants, we found that in the intertidal zones, oysters could be very concentrated as they reefed/clumped together with 478 and 444 as average counts of oysters per meter square in MC and QR (north of Grand Avenue), respectively. At the two sites, we counted the average spat from the August spawning cohort to be 136 and 104 per meter square. The June cohort was lesser, i.e., we found fewer spats at sizes representative of the June spawning cohort. As oysters were assessed only once in October, it is possible that juveniles from July were more numerous, and their lower abundances resulted from mortality by predation. However, we need to gather sufficient evidence to support that hypothesis. We have not recorded many shells as chipped by crab claws or pierced by the predatory snail, the oyster drill; therefore, causes of mortality remain unknown. However, based on the low counts of dead spat, the apparent mortality in the 2022 season was very low. Open shells were found throughout the entire size spectrum in the QR. Still, in

MC, dead oysters were in a narrow range (i.e., primarily for the 1-3 year cohorts). Mortality appeared higher at the QR intertidal site (23%) compared to MC (13%). It is important to remark that while MC is much more developed as an oyster reef, the intertidal zone along the QR is less colonized by oysters. The area nearest to the Grand Avenue Bridge (i.e., 41.308817, -72.887112) is a site of developing dense reef, while northward of that area and passing the location of the boat launch (i.e., 41.310386, -72.884777) is much patchier, with a large proportion of the bottom being muddy and with few oyster clumps. The limitation of oyster reef development appears to be directly related to the bottom substrate. As the river is a site of active aquaculture with the annual provision of cured oyster shells onto the bottom, some of the shells may be spilled or moved by the waves toward the shore, thus offering good conditions for oysters to colonize. The preferred substrate for larval oysters to settle onto is the oyster shell, indeed. No other area along the assessed shore section (eastern riverbank north of the Grand Avenue Bridge) is similar in area coverage. The shoreline is fringed by a very thin – maybe a foot or two (Note: we did not explicitly measure the depth of the marsh grass) marsh grass belt. This marsh belt stretches along the riverbank towards the much larger marsh, the Quinnipiac Meadows Eugene B. Fargeorge Preserve (Note: our assessment ended far before reaching that marsh; more effort is required to enable a thorough shoreline assessment of the QR).

Re Objective 3): We have successfully engaged representatives of the groups listed in Objective 3, except for NOAA interns, who were obliged to attend to other projects. Sound School teachers and students benefited from participating in this project, before which they were unaware of the intertidal oyster reefs in New Haven. Two Sound School students performed a research project on oysters in MC and became finalists in the 2023 Connecticut State Science and Engineering Fair with their project titled "Potential role of proximity to creek source water on population dynamics of American oyster *Crassostrea virginica*". These students will continue exploring the science of intertidal oyster reefs for another two years. Mr. Charles Mulligan, their teacher, will be overseeing these projects.

Re Objective 4): Throughout the project, we took opportunities to share knowledge within our group and with others who were interested. Dr. Baumann collaborated with project partners on presentations offered to the scientific and regulatory community at the 2023 Milford Aquaculture Seminar (~200 participants) and using the Green Drinks forum (Green Drink's Facebook page) to the general public (Event held on March 4th, 2023 attended by 85 people, and as the event was live-streamed via the Facebook page of the New Haven Bioregional Group, others were able to listen in) at the Q River Grille located directly ashore the QR. While the study results were interesting to share, the two events allowed for meaningful conversation on other New Haven and Quinnipiac River relevant matters. One person, for example, shared the history of eelgrass in the river; others wondered if eating oysters from the river was safe as employees of Copsps Island Oysters joined the event by donating oysters for raw bar and presenting information about the water classification system for oyster aquaculture. For example, QR waters are prohibited for harvest, and waters in Morris Creek (a State protected oyster reef). The 2022 project strengthened our understanding of the QR and MC and inspired more ideas for the future.

2. Please share your successes, challenges and any lessons learned through the implementation of your project. Were there any unintended consequences or lessons learned that may affect how you operate your program moving forward?

Overall, the project could be defined as highly successful; however, there were some setbacks and modifications due to available funds, supply chain issues, and other aspects impacting feasibility. We hoped to have oysters studied for diseases, but we had to eliminate this component of the study due to budgetary limitations. However, through our communications with NOAA Milford scientists, we learned that the disease might be studied in oysters from Morris Creek this year. We hoped to have several oysters from Morris Creek and Quinnipiac River looked for PFAS, but instead, Dr. Baumann was successful in reaching out to scientists at UConn's Center for Environmental Sciences and Engineering as well as the Department of Natural Resources and Environment with whom she applied for funding to Sea Grant and were successful in obtaining these funds. Thus, while PFAS were not studied in oysters in 2022, this research will be performed in 2023 using a more significant number of oysters from the initially intended sites and with the addition of finfish from New Haven Harbor. Water will also be analyzed for PFAS. Results

of the study will be publicized no earlier than 2024 or 2025, depending on the progress of all analyses and work required towards other projects – all PIs are multitasking on several projects. Furthermore, water monitoring, with the aid of data loggers, suffered from supply chain delays. The pH loggers and one of the salinity loggers were delivered only in July, while oxygen and temperature were monitored from May, and the initial year of monitoring allowed us to learn about logistics. One unfortunate event that occurred in Morris Creek was when an unknown person removed equipment from the site. However, swift action by Mrs. Lynne Bonnet (key project partner and president of New Haven Bioregional Group), who resides in East Haven, allowed retrieval of the loggers. Through posting at the site, we offered a \$100 reward to the person who delivered back the missing equipment. Dr. Baumann covered that expense from personal funds. We, therefore, were able to continue monitoring and to avoid the same problem, we selected a different location in the creek using a deeper indentation in the bottom. Hence, the loggers are never visible, even during very low tides. The incident of missing equipment was not isolated, as we learned from another New Haven-based scientist of a similar misfortune. We are better prepared to avoid this type of situation in the future, and we learned how swift collaborative action and rapid communication could help solve the problem. Through the project, we learned to collaborate with Sound School, and there is more that we have to work out. Challenges of working related to schedule constraints as students' availability is limited; however, planning fieldwork and training students before fieldwork will ensure their independence while performing tasks under their teacher's supervision. One positive outcome is the discovery of the ease of communicating with Sound school teachers, specifically Mr. Charles Mulligan, whose openness to collaboration is remarkable and much appreciated. We look forward to collaborating with the Sound School in the future, including most immediately during the new Sea Grant project on PFAS in shellfish and finfish in New Haven Harbor. Despite schedule misalignment, two female students of the Sound School took up research on oysters' in Morris Creek and became finalists in the Connecticut Science and Engineering Fair in 2023. This success further motivated these students to continue evolving their research at Sound School during the coming two years. Lastly, we hoped to study the intertidal and subtidal oysters in the Quinnipiac River. However, heavy boat traffic and insufficient time availability prevented us from performing subtidal oyster monitoring. However, during the project, we learned of a lot leased by Gather New Haven, where oysters have not been directly disturbed by the oyster dredge. We are in the midst of preparation to enable a scuba-based study of that lot to understand the architecture of the bottom there as compared to dredged lots. This future project can inform several activities, including further research on the impacts of reefs in controlling pollutant transport or attracting other species seeking shelter in complex three-dimensional bottom features. We also became aware of Enterococcus in the water during dry days (results generated by Mr. Richard Harris from our team), which further triggered our interest in offering connections and outreach to encourage and facilitate pump out of boats that use the two marinas that are located north of the Grand Avenue Bridge.

3. What are the opportunities and needs of your organization as it continues to move forward with its work to positively impact the Quinnipiac River?

Our team is dedicated to improving our understanding of the conditions in the Quinnipiac River. Presently, conditions in the Quinnipiac River can support the full life cycle of Eastern oysters, which suggests good water quality. The river could benefit from a more robust marsh in the intertidal zone. The marsh along the river is very thin and could be bolstered. Community coming together and recognizing this need will be required.

One great opportunity for our team is to gather with people from the neighborhood at the Q River Grille or the Copsps Island Oysters property directly on the river. The show of 85 people at the public lecture in March 2023 showed the excellent engagement level of the community in the issues related to the river. Such gatherings are essential because they create the ground for the exchange of ideas, opinions, and other important information; they are crucial to building plans. Our continued presence and interaction with the community allow us to keep learning about issues that we otherwise may not be aware of, and there is an enormous value to that. Our group will require more time and financial resources to continue working with the community and investigate what restoration projects are feasible in this heavily built area with residences and the presence of oyster aquaculture, boating, kayaking, and possibly other activities.

Attachments

Financial information (required): Please provide a detailed accounting of how the specific grant dollars were spent based on the budget submitted in the grant application.

Detailed Accounting

Financial Information-3.30.23.pdf

Pictures (optional): Please attach one to three pictures in JPEG format, in the highest resolution possible, of activities that have occurred throughout the grant period as a result of grant funding. By providing pictures, your organization is consenting to unlimited use of the pictures by The Community Foundation for Greater New Haven and/or the Valley Community Foundation in publications in print and online (including www.thequinnipiacriver.com). Please include a description of each photo and, when known, the photographer to be credited.

Picture 1

Oyster2.jpg

Description and Photo Credit

Sound School students and community members participating to oyster monitoring in Morris Creek in October 2022. Photo credit: Tom Rettig/UConn

Picture 2

Water Monitoring in the Quinnipiac River.png

Description and Photo Credit

Water monitoring in the Quinnipiac River by the Copps Island Oysters team led by Mr. Richard Harris. Photo credit: Zofia Baumann/UConn

Picture 3

Public Lecture at Q River Grille .png

Description and Photo Credit

Many of the Green Drinks participants gathered outside the Q River Grille ashore the Quinnipiac River. Photo credit: Aaron Goode/New Haven Bioregional Group