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

Quinnipiac University

Grant Description

to support the study of emerging contaminants resulting from the use of consumer health or cosmetic products or from veterinary medications.

Total Grant Amount

14,000.00

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).

Objective 1: Method development of PPCP concentrations using solid-phase extraction (SPE) cartridges, extraction, and analysis via GC-MS. Method development will allow for the optimization of flow rate and compound recovery from the SPE cartridges.
Method development to concentrate the PPCPs using Oasis SPE cartridges was conducted. Sample water was pre-filtered through 0.7 µm GF/F filters to filter out large particulate matter that would have clogged the SPE cartridge. Approximately 300-600 mL of filtered sample water was passed through the SPE cartridge at a rate of 10-15 mL per min. If samples were not extracted immediately, they were wrapped in aluminum foil and frozen. Extraction was performed using 6 mL of methanol at a rate of ~0.2 mL per min and then analyzed by gas chromatography-mass spectroscopy (GC-MS). Extraction efficiency was estimated to be 25-60%. The results showed measurable but

low amounts of several PPCPs, however more common were fertilizers, hydrocarbons, and precursors to plastics.

Objective 2: Collect and analyze water samples between Meriden and New Haven, CT including above and below two municipal wastewater treatment plants. At each sampling location, in situ temperature, pH, and salinity will be measured and bulk samples collected for the analysis of PPCPs, dissolved nitrate, nitrite, organic carbon (DOC) concentrations, and E. coli and total fecal coliform.
Samples were collected five times between June-August 2023 and three times between November 2023 and January 2024. Samples were collected at seven locations between Meriden and New Haven, CT including above and below two municipal wastewater treatment plants. For locations influenced by tides, sampling was always conducted on the outgoing tide. Summer water temperature, pH, and salinities ranged from 21.2-26.3 °C, 7.34-7.95, and 0.13-25.1 ppt, respectively, while winter water temperature, pH, and salinities were 4.6-10.3 °C, 7.62-8.28, and 0.18-23.3 ppt, respectively. The two southern-most sampling locations had elevated salinity, which corresponded with lower nitrate (below detection limit to 35.61 µM) and nitrite (0.43-2.50 µM) concentrations, as well as lower fluorescence compared to the northern five sites (nitrate (30.63-158 µM), nitrite (1.2-11.3 µM). However, fluorescence indicated greater amounts of freshly produced organic matter in the higher salinity locations compared to the lower salinity locations. 60% of the samples analyzed surpassed the EPA's threshold for E. coli. The higher salinity locations generally had lower colony counts than freshwater locations, and winter samples were elevated over summer samples.DOC concentrations were lower in the summer than in the winter with the higher salinity locations having lower (summer 1.91-2.21 mg/L, winter 2.56-5.57 mg/L) DOC concentrations than the lower salinity locations (summer 2.06-4.60 mg/L, winter 4.50-7.84 mg/L).

Objective 3: Disseminate study results through presentation of research at a local or regional conference and through Quinnipiac University's Public Relations Office to local news outlets.
The research student who is working on this project will present this research at the local ACS-New Haven 8th Annual Student Research Symposium, 13th Annual Quinnipiac Sigma Xi Student Research Symposium, and the 1st Annual Quinnipiac University CAS Student Research Symposium.

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 was successful. Initially, concentrating the water samples using the SPEs was very time consuming as it was done manually, However, once we purchased SPE adaptors and tubing this part of sample processing was much more streamlined and allowed for greater automation. This improved consistency between samples. PPCPs were low throughout the sampling period. Most of the compounds that were identified through SPE extraction were likely from runoff rather than from water treatment plants. To try and improve detection, derivatization of samples will be tested during the

next sampling period. Additionally, to better characterize dissolved organic matter fluorescence, parallel factor analysis will be conducted next year. No unintended consequences were noted during this year.

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?

We are committed to monitoring the water quality of the Quinnipiac River including the presence of emerging contaminants which could affect organisms that live in and around the river, as well as humans who use the river for recreational activities. It will be important to continue to monitor the river as climate change impacts rainfall amounts, storm intensity, sea level rise, and seasonal temperatures. Additionally, anthropogenic activities around the river could alter the types and concentrations of anthropogenic materials that enter the river, which could have short- and long-term impacts on organisms.

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

Quinnipiac University_Quinnipiac River Fund 2023 Budget.xlsx

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

QRF2023_Sampling.jpg

Description and Photo Credit

Research assistant sampling at the Sackett Point boat launch in the Quinnipiac River Marsh Wildlife Area (Photo credit: J. Kinsey)

Picture 2

QRF2023_SamplePreparation.jpg

Description and Photo Credit

Research assistant concentrating samples using solid phase extraction (Photo credit: J. Kinsey)

Picture 3

Description and Photo Credit