

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 New Haven

Grant Description

to support to the study of the thermal profile of the Quinnipiac River in response to climate change.

Total Grant Amount

13,822.00

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).

The primary objective of this project – to create a thermal profile of the Quinnipiac River – while still in progress appears to be successful. The use of the temperature and solar radiation dataloggers has allowed for the generation of overall thermal and solar radiation profiles of the Quinnipiac River through the assistance of Geographic Information Systems (GIS) software (see the attached images). The complete profiles intended to be generated through this project are not yet complete at this time because the data needed to create them (a full year of data collection) has not been collected in full yet. Once a complete annual dataset has been collected, a manuscript will be submitted to a scientific journal for publication.

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?

By far, the greatest challenges were the limitations associated with the COVID-19 pandemic. Unfortunately, the University of New Haven campus

that served as the base of operations for this project was closed until early June of 2019 as a result of the onset of the pandemic. In addition, it also caused substantial shipping delays which most affected the arrival of the thermal drone purchased for this grant, which was ordered in mid-April but was not received until late July. However, this did not halt the other operations of this grant such as the hiring of the research assistant and the deployment of the data loggers. The research assistant as well as the PI were able to obtain FAA UAV licenses in preparation for drone operation, become familiar with the GIS system, and begin gathering historical data about the river. Data loggers were deployed at the beginning of July 2019 and data was collected from them numerous times throughout the summer and the remainder of the granting period.

Despite earning UAV licenses through the FAA, the process of learning how to operate the thermal drone and how to correctly use its associated mission software was more difficult than anticipated. Although the PI had drone-related research experience prior to this project, a flight-assisted system has not been used before and a user guide for the flight software does not exist. The researchers kept in close contact with the sellers to mitigate software issues as much as possible however the sellers also did not have a guide for the flight planning system. Overall, it took longer than anticipated to get the thermal system ready for flight over the river, creating a slight delay. Unfortunately, the collision incident that rendered the original system inoperable also interrupted the data collection timeline. It took over two weeks to get the system sent to the manufacturer and to then receive the replacement. Additionally, once the replacement was received, there appeared to be numerous software issues on the system itself that had to be corrected before flight would be safe. Similarly, the thermal camera that the manufacturer supplied as the replacement was different from the original in that it had a narrower field of view; which required changes to the original pre-determine flight paths, "missions" of the system. Moreover, in conjunction with course schedule conflicts and the replacement system not arriving until late October 2020 when the weather was generally not ideal for flying, adequate opportunities to fly were scarce.

The final issue encountered was the number of data loggers needed for accurate and complete data collection. Some data loggers could not be located when the researchers went out for periodic collections and needed to be replaced; likely due to tidal influences and storm surges. Similarly, more than one data logger was 'shocked' by the January 2021 temperatures and also needed to be replaced. While the data loggers used for this project should have been able to handle the temperatures, failures do happen. Fortunately, the PI had the same data loggers for his personal research endeavors that were used as replacements.

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?

As this grant work continues in the future, student involvement in all aspects of the research will carry on. Student activities will include data collection through both the data loggers and the thermal drone as well as data analysis via GIS. Thermal data using the data loggers and the thermal drone system will continuously be collected until a complete annual dataset is generated, if not beyond that. The thermal data collected through this project will form the basis for future research, namely the PI's newly supported project, as well as other undergraduate honors and graduate student theses.

The equipment purchased through this grant will be used in the future for upcoming research such as the projects previously mentioned. All the data collected through this research as well as future projects that utilize the associated equipment will be made available to all researchers for use in as many projects as possible. At this point, neither the PI nor the University of New Haven will need any additional financial assistance from the Quinnipiac River Fund for the continuation and subsequent completion of this project.

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

PV122_Final Fiscal Report.pdf

Pictures (optional): Please attach 1 to 3 pictures of activities that have occurred throughout the grant period (with a description for each) as a result of grant funding. All pictures should be submitted in JPEG format and may be uploaded to www.thequinnipiacriver.com and used in Foundation publications.

Picture 1

OverviewMap.pdf

Description

Figure 1: A GIS-generated map displaying the overall research area. The spatial reference map in the upper right shows where the Quinnipiac River watershed is located in the state of Connecticut. The pink dots represent the locations of the temperature/solar radiation datalogger used. The orange triangles represent municipal waste disposal locations and the green triangles show sewage treatment plants, all located within the watershed. Spatial data supplied by CT DEEP's Open Data website.

Picture 2

AverageTemperatureMap.pdf

Description

Figure 2: A map displaying the thermal profile of the Quinnipiac River for the month of July 2020. The map was generated by performing a GIS Inverse Distance Weighting spatial analysis masked by the Quinnipiac River polygon using the average temperature values collected by the various data loggers.

Picture 3

AverageLightIntensityMap.pdf

Description

Figure 3: A map displaying the solar radiation profile of the Quinnipiac River for the month of July 2020. This map was generated by performing a GIS Inverse Distance Weighting spatial analysis masked by the Quinnipiac River polygon using the average light intensity values collected by the dataloggers. This map may not be as accurate as Figure 2 due to algae build-up on the data loggers between readings; resulting in decreased measurements of solar radiation. Additionally, as the lowest three dataloggers are located in tidally influenced areas, some solar radiation values may have been recorded in the air at a neap tide rather than within the water column itself.