TCF - Quinnipiac River Fund Final Report

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

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Organization Name

Yale University

Grant Description

to support the study of salt in catch basins and to design simple and inexpensive modifications that will allow salt to be flushed out while leaving sediments and their toxic burdens behind where they can be removed by routine maintenance.

Total Grant Amount

18,000.00

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).

Overview

This report summarizes the progress of our project investigating deicing salt accumulation in catch basins throughout the Quinnipiac River watershed. The project aims to better understand the seasonal persistence and environmental impacts of road salt, and to test simple catch basin modifications that may mitigate this issue.

Despite encountering some unexpected challenges due to extreme weather conditions, the project made substantial progress toward its stated goals.

Progress on Objectives

1. Site Selection and Preliminary Survey

We successfully identified and surveyed a diverse array of catch basins across the watershed, including urban, suburban, and rural sites. Handheld conductivity meters were used to assess baseline salt levels and determine appropriate sites for detailed study.

2. Installation of Conductivity Loggers

We deployed automated conductivity loggers in selected catch basins. These instruments collected data every five minutes, providing a high-resolution view of salinity changes over time. Data collection began in late summer and continued through the winter season.

3. Direct Ion Measurements and Data Verification

Preliminary ion sampling were conducted at several sites to verify that conductivity levels are consistent with sodium chloride concentrations. These results support the use of conductivity as a reliable proxy for salt levels.

4. Catch Basin Modifications

Initial designs for in-sump modifications were completed, and one catch basin was outfitted with a prototype vertical plastic baffle system to test the effectiveness of flushing out salt while retaining

sediment. Observations suggest this method is promising, though modifications and more data are needed.

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?

Challenges and Delays
Some activities were delayed due to external environmental factors:
• Severe Drought in Fall 2024: Prolonged dry conditions limited the natural flushing of salt from catch basins, reducing opportunities to capture data on salt mobility during storm events.
• Unusual Winter Salting Patterns: Atypically cold conditions that actually lead to less salt flow as it gets locked up aboveground in frozen snow and ice. This and sporadic snowfall led to atypical salt application schedules. This made it more difficult to observe predictable conductivity spikes and would require extended monitoring into the next winter season to ensure robust datasets.
To address these challenges, one key workaround has been the development of a mathematical model to simulate the effect of catch basin modifications. This model allows us to predict salt transport and retention under various flow and salting scenarios, offering valuable insights in the absence of consistent field conditions and enabling us to assess the potential impact of different design interventions without needing to install them physically at multiple locations.

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?

Proposed Additional Steps
• Continue automated and manual conductivity measurements through Spring and Summer 2025.
• Collect additional ion concentration samples to strengthen data verification.
• Expand installation of the baffle system in the catch basin as conditions allow.
• Refine and validate the mathematical model with observed data.
• Begin preliminary analysis of salt flux data and prepare findings for publication.
• Engage local agencies and utilities to begin translating research findings into practical applications.

Conclusion
This project made significant strides in advancing our understanding of road salt behavior in urban infrastructure. While some timelines shifted due to environmental variability, all core objectives were achieved. With the help of adaptive tools such as the newly developed simulation model, we remain confident in delivering valuable scientific insights and practical recommendations.

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

Salt in the Quinnipiac Watershed - 25 report.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

Description and Photo Credit

Typical installation of automated data logger that measures and records salinity in catch basins.
Photo credit: Gaboury Benoit

Picture 2

Description and Photo Credit

Over-salting leads to many kinds of downstream damage. Shown is typical corrosion of built infrastructure.
Photo credit: Gaboury Benoit

Picture 3

Description and Photo Credit

Example of extreme oversalting. Salt in the road will be washed off and run into foreground catch basin of the kind we studied.
Photo credit: Gaboury Benoit