Water Quality Changes in the Farmington River

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Introduction

The salinity of river ecosystems is an important component of aquatic habitats. Conductivity levels of approximately 120 to 240 µS/cm are benign for aquatic life, while salinity levels exceeding 360 µS/cm can impair ecosystem function[1].

The purpose of this study was to understand the conductivity levels of the Farmington river and the surrounding rivers to determine if they are fit for aquatic life. If the conductivity of the water is too high, then water quality mitigation strategies must be taken in order to improve the habitats for aquatic organisms.

However, during the tests that were taken during the NRCA Field CAP program, the measured conductivity levels of the rivers went far above 360 µs/cm. Therefore, if it is following the trend set by the rivers measured during the program, the conductivity of the Farmington River should eventually exceed 360 µS/cm at some point in the year.

Methods

- **In August, 2017, nine sites were identified (Fig 1): four in the Farmington River Unionville & Farmington, CT), two in Scott Swamp Brook (Farmington, CT), one unnamed Farmington River Tributary (Farmington, CT), one unnamed Farmington River tributary (Barkhamsted,CT), and one in Beaver Brook (Barkhamsted, CT).**
- **Mr. Christopher Bellucci from CT DEEP kindly provided data from a station monitoring temperature and conductivity at a site along the Farmington River in Tariffville, CT.**
- **An Ubante TDS Meter was used to measure the conductivity and temperature at each site.**
- **The Farmington River and Scott Swamp Brook locations were monitored once per month. Farmington River Tributary and Beaver Brook locations were monitored once in August and once in December.**

Results

The Farmington River sites

- **The conductivity of the Farmington River sites ranged from 100 to 500 µS/cm in Farmington, and varied from month to month (Fig 2).**
- **The temperature of the Farmington River rapidly decreased over the course of fall but slightly increased in January (Fig 3).**

The Brooks Surrounding the Farmington River

- **The conductivity of the brooks surrounding the Farmington River in Farmington ranged between 470 and 550 µS/cm during the summer and early fall, and decreased to 150 to 280 µS/cm in the second half of the fall and the winter. The conductivity of the brooks surrounding the Farmington River in Barkhamsted ranged from 20 to 80 µS/cm (Fig 2).**
- **The temperature of the brooks all decreased over the course of the fall, but slightly increased in January (Fig 3)**

Potential Sources of Error

Measuring each site only once a month means that we may not have witnessed large changes that may have occurred; if the conductivity of the river suddenly spiked due to road salts early in the month, and we measured it later during the month, we would not have recorded that data. Many times we also measured different spots on each site; these different spots may also have differing conductivities. Finally, we would often try and collect data when the weather was ideal for traveling, which may have played a big part in the conductivities of the sites.

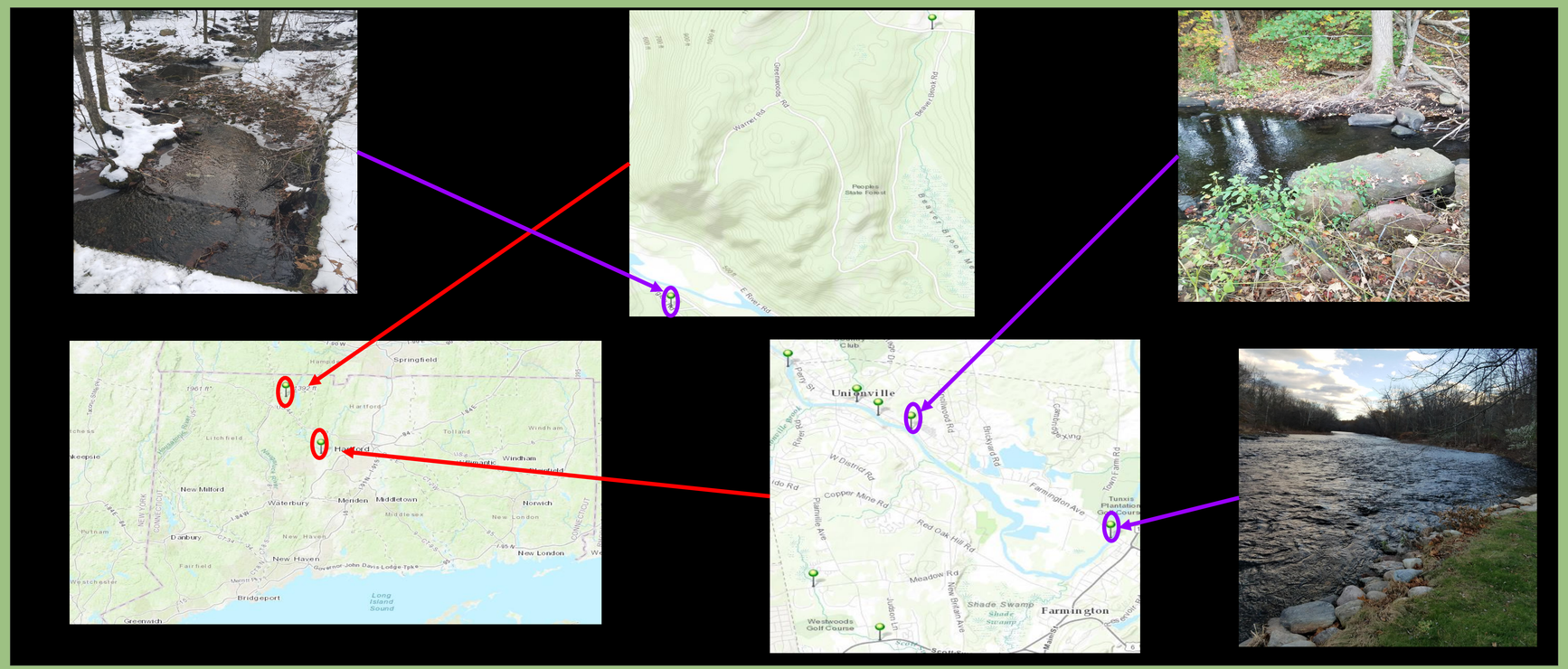

Fig 1: A map of the sites visited. In the Barkhamsted Area (map in the top right corner), the waypoint in the bottom left corner is on an unnamed Farmington River tributary near Legion Road. The waypoint in the top right corner of the Barkhamsted map is on Beaver Brook. In the Farmington Area (map in the bottom right corner), the waypoints clustered in the top left corner are all on the Farmington River, except for the waypoint closest to the right; that waypoint is on another unnamed Farmington River tributary. The waypoints in the bottom left corner are on Scott Swamp Brook.

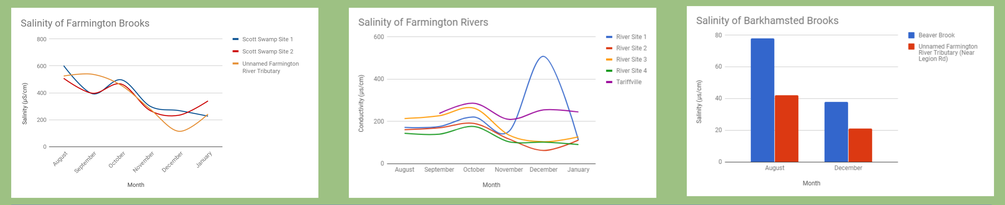

Fig 2: The changes in conductivity of each area tested. Left: changes in conductivity in the tested Farmington area brooks; Center: changes in conductivity in the Farmington River itself; and Right: changes in conductivity in the tested Barkhamsted area brooks.

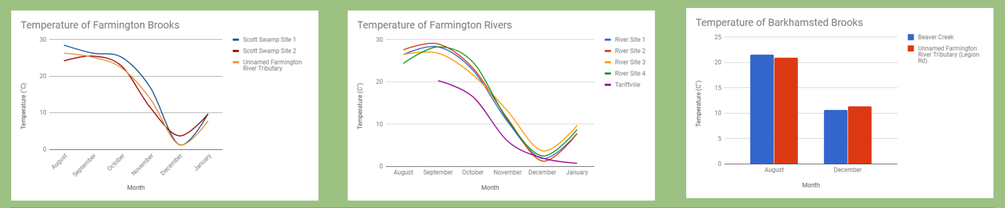

Fig 3: The changes in temperature of each area tested. Left: changes in conductivity in the tested Farmington area brooks; Center: changes in conductivity in the Farmington River itself; and Right: changes in conductivity in the tested Barkhamsted area brooks.

Conclusions

In terms of conductivity, the Farmington River appears to be well under the salinity limit for most aquatic life; their salinity levels did not exceed 360 µS/cm over the course of the summer, winter, and spring.

The tributaries of the Farmington River in Barkhamsted have exceptionally pure water; their salinity was constantly under 120 µS/cm. However, while the brooks in Farmington are generally adequate for aquatic life in late fall and winter, their salinity levels exceed 360 µS/cm in the summer and early fall, reaching 545 µS/cm. Action must be taken to ensure that aquatic biodiversity does not decrease during this time of year. Potential sources of action include mixing other substances in road salt, such as beet juice, in order to decrease the amount of salt in the road salt, and therefore decreasing the conductivity increase in the rivers when runoff from roads enters the streams.

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REFERENCES

The Last Green Valley. 2008. Water Data Analysis Information. Volunteer Water Quality Monitoring Program. Putnam, CT.