Distribution of Macrobenthos in the Quinnipiac River

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Introduction

Endocrine disruptors are a class of chemicals that can affect an organism's endocrine system, which in turn can cause developmental, reproductive, and neurological damage to living creatures (National Institute, 2015). Chemicals like pesticides, plasticizers, and synthetic hormones are examples of potential endocrine disruptors that can be found in the environment (Sanseverino *et al.* 2005). Substances that mimic human hormones can have an adverse effect on wildlife and people, which may lead to early puberty, reduced sperm count, or increased risk of certain cancers.

The Quinnipiac River is of interest due to historical pollution and because it is the discharge point for several wastewater treatment plants and industries. Recently multiple sites along the Quinnipiac River have been tested and examined for estrogenic compounds by students at the University of New Haven using a bioluminescent yeast bioassay (*Saccharomyces cerevisiae*) (Bergamasco *et al.*, 2011). The results have demonstrated that there are estrogenic compounds detectable in parts of the Quinnipiac River. Since estrogenic compounds have been found in some parts of the river but not others, the project has expanded to determine whether the clean parts of the river are actually clean.

Since endocrine disruptors are known to have effects on organisms and their presence has been detected in parts of the river, the goal of this research was to determine if the presence of estrogenic or toxic substances affects the organisms living in the Quinnipiac River. Benthic macrofauna are organisms bigger than 1.0mm in size that are found on/in the sediment. It is expected that the more pollution there is, the lower the species richness of the benthic macrofauna. As part of this larger project, I looked for patterns in the diversity of the macrobenthic community since these organisms are exposed to varying amounts of estrogenic compounds along the river in an effort to demonstrate whether the presence of estrogen is actually affecting the species in the river.

Materials and Methods

Sampling and Sorting: Triplicate samples were collected at sites in Plainville, Southington, Plantsville, and North Haven. All the samples were transporting back to the lab and all macrobenthos were collected and preserved in 70% ethanol.

Identification: Microscopy and morphological characteristics were used to identify the bugs down to the family level. Once the macro benthos were identified to the family level they were classified by their level of sensitivity to pollution. Patterns of the macr benthos are being compared to the amount of estrogenic and toxic compounds found in those location by the bioluminescent yeast assay.

Results

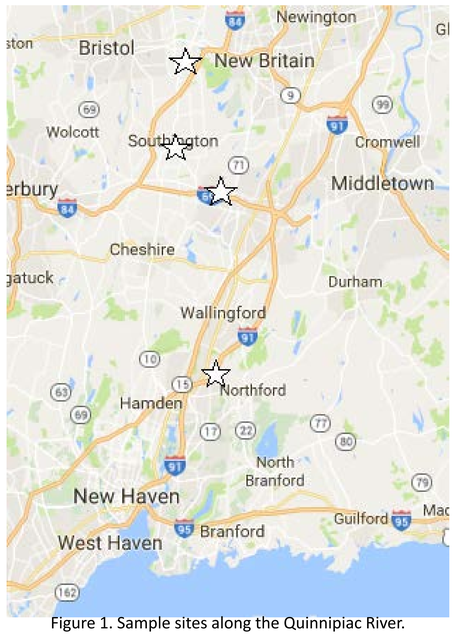

Figure 1. Sample sites along the Quinnipiac River.

Figure 2. Using the Serber Sampler to collect the macrobenthic community.

Figure 3. Example organisms collected from the macrobenthos.

Plainville			
Indicator Groups	Amount	% Abundance	Index Score
Riffle Beetle	1	Rare	2
Caddisflies	7	Common	3
Midges	3	Common	-2
Scuds	18	Dominant	-4
TOTAL	29	-	-1

Table 1: The chart pictured to the left is the data for the water quality rating from Plainville sample one on July 13, 2016. A rating of -1 translates to poor water quality.

Southington			
Indicator Group	Amount	% Abundance	Index Score
Mayflies	1	Rare	3.5
Stoneflies	1	Rare	3.5
Riffle Beetle	2	Common	3
Segmented Worms	3	Common	3
Caddisflies	10	Dominant	2.5
Midges	4	Common	-2
Scuds	7	Common	-2
TOTAL	28		11.5

Table 2: The chart pictured to the left is the data for the water quality rating from Southington sample one on July 13, 2016. A rating of 11.5 translates to poor water quality.

Table Key: The indicator groups are the different types of macro benthos found in one sample. The amount tells how many of that indicator group there was. The percent abundance tells if the indicator group is rare, common, or dominant based on what percent it is of the total amount of macrobenthos found. The index score is a scoring system that takes into account the percent abundance and the indicator group's level of relative tolerance to water conditions.

Conclusions

The macro benthos from the samples taken over the summer have been identified down to either the order or family level. Before any patterns about the distribution of the macrobenthos can be identified more samples need be collected over the course of the next few months. Once more samples are collected the data will be compared to the amount of estrogenic and toxic compounds found in Quinnipiac River.

References

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