

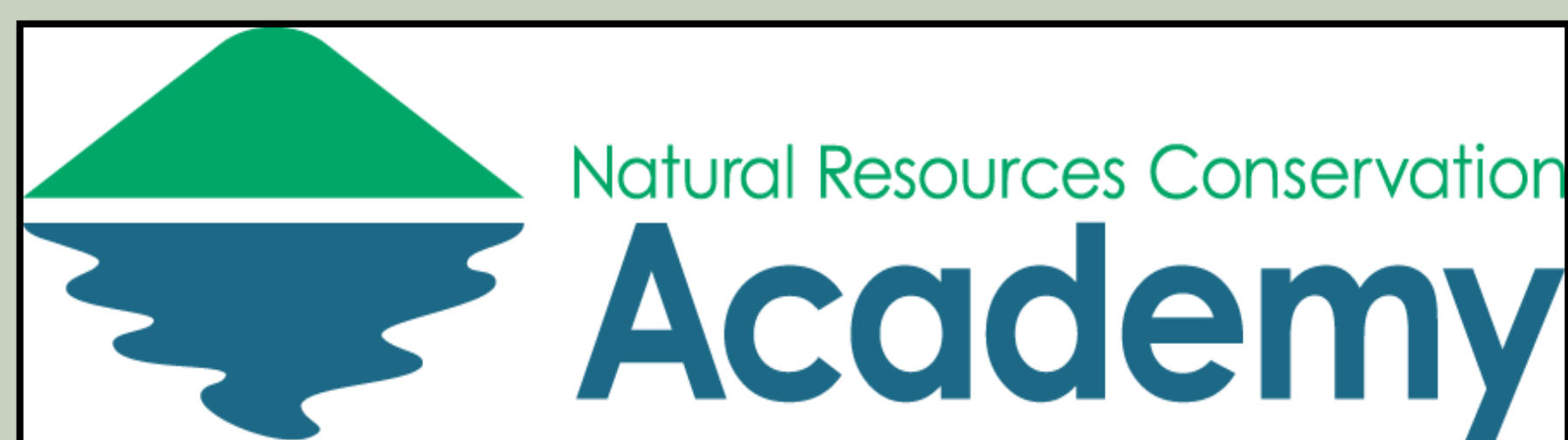
Variation in Macroinvertebrate Bioindicators of Water Quality

Over a Five Year Span

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ABSTRACT

Freshwater is one of the major necessities for life. Consequently, it is important to assess water quality over multiple years to identify areas in need of management, especially in areas with increasing human activity and disturbance. One way to assess water quality is by surveying macroinvertebrate bioindicators (Fig. 1) using the Rapid Bioassessment by Volunteer (RBV) approach. The objective of this project was to use RBV to see how water quality in rivers in Salem, East Haddam and Lyme had changed over multiple years. During this study, we tested the water quality of three different sites with the RBV method. We then compared macroinvertebrate data from the three sites over a five year period. Our major findings showed that water quality was more or less consistent through time. These findings show that the water quality was consistent in the Eightmile River and its tributaries over a five year period.



Fig 1. These are some of the species of macroinvertebrates we collected in the streams we surveyed: (top and bottom left) caddis fly larvae, (top middle) stone fly larvae, (bottom middle) water penny, and (far right) may fly larvae. Each species has a varying tolerance to pollution. Presence of species with a lower the tolerance to pollution indicate higher water quality (images taken by TRCC students).

INTRODUCTION

The Eightmile River is an incredible ecosystem. Freshwater systems like this are irreplaceable and essential for different and rare forms of life. Accordingly, for my project I wanted to explore how water quality in rivers in Salem, East Haddam and Lyme varied over time to identify areas in need of management. A useful approach to evaluate water quality is by monitoring the presence of macroinvertebrates that are sensitive or tolerant to the freshwater conditions in which they live (Fig. 1). The Rapid Bioassessment by Volunteers (RBV) approach is one way to monitor water quality by using macroinvertebrates as biological indicators. The Eightmile River Watershed contained many outstanding resources and was designated as Wild and Scenic in 2006. After the Study bill was passed by Congress, a local Wild and Scenic Study Committee was formed, charged with carrying out the Wild and Scenic Study and developing a river management plan.

The main objective of this study was to test the water quality of rivers using the RBV approach and compare it to older data from the same rivers to look at variation in quality over time. The main question we were trying to answer was: will quality of certain rivers decrease over time due to natural causes? We hypothesized that the water quality stayed fairly consistent, due to the protection of that area.



Fig 2. In these photos (left and right) it shows a of couple of students from TRCC completing RBV with Diba Khan-Bureau. (Middle) This is a photo of the macroinvertebrates that were caught and placed into ice trays categorized by species.

MATERIAL AND METHODS

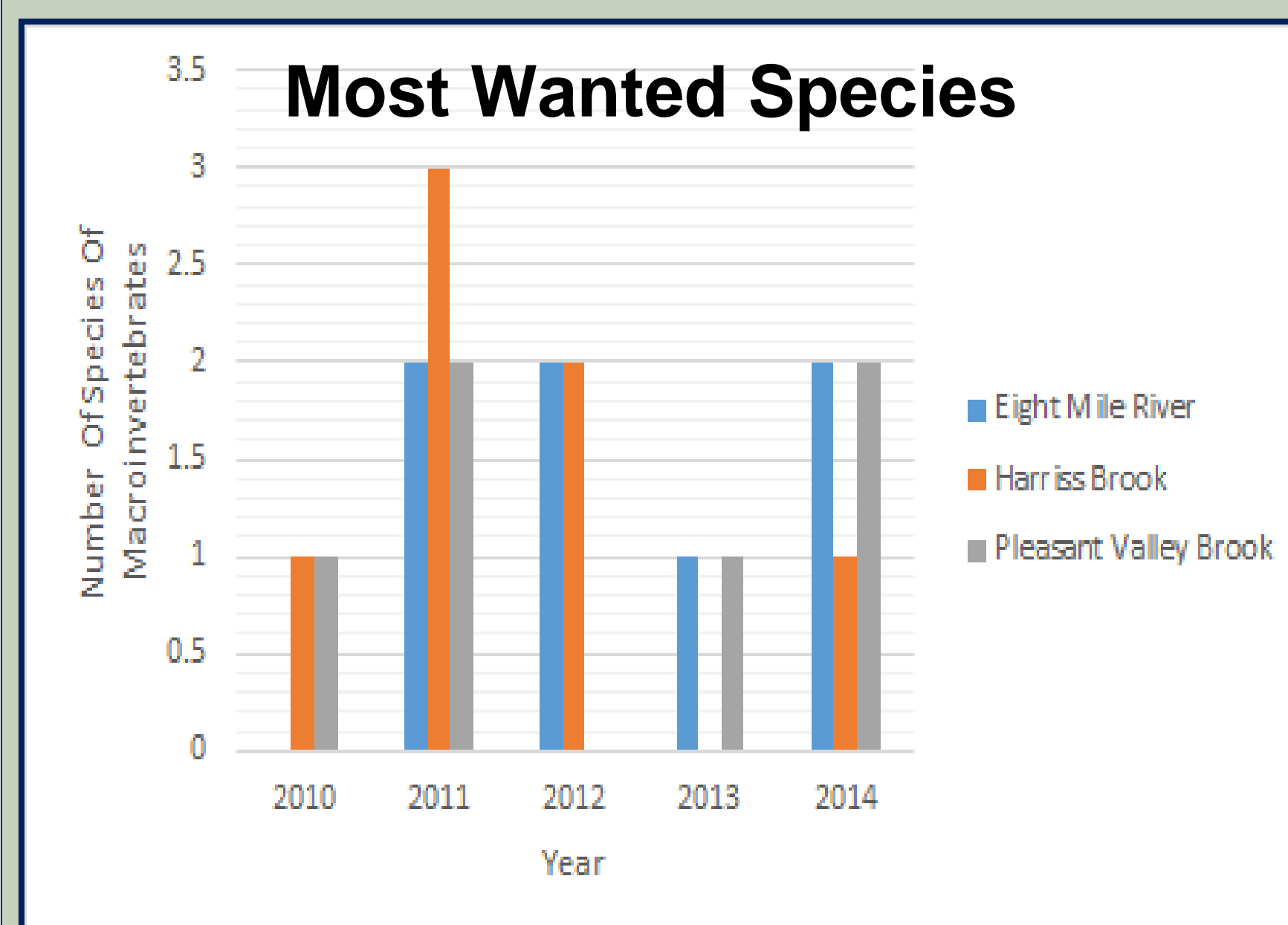
Macroinvertebrates in Streams of CT

- We collected data at three sites, including Pleasant Valley Brook, Harris Brook, and the Eightmile River.
- Each site was located near a road and other anthropogenic establishments, which may have some affect on the results
- Each site in the river had multiple riffles where we could conduct our study.
- We monitored macroinvertebrates (Fig. 1) to help assess water quality because certain types of macroinvertebrates are sensitive to pollution.
 - Most Wanted Species: Species of macroinvertebrates that have the lowest tolerance to pollution such as water pennies.
 - Moderately Wanted Species: The species of macroinvertebrates that have the most moderate tolerance to pollution such as stoneflies.
 - Least Wanted Species: The species that can live anywhere due to their high tolerance to pollution, such as leeches.

Data Collection Protocol

- To collect data we used the RBV approach, which required the following materials: ice cube trays, nets, scrub brushes and waders.
- Next we placed the nets in riffle habitat (Fig. 2).
- To collect the macroinvertebrates, another person scrubbed rocks to dislodge macroinvertebrates into the net.
- After a sufficient amount of disruption, the contents of the net were placed into a tray and all the macroinvertebrates were placed into separate ice tray compartments.
- We recorded which species were present.
- This data was collected over the course of 4 years at 3 sites, but I visited these sites during November of 2015 as well. Only data from 2010-2014 were analyzed.

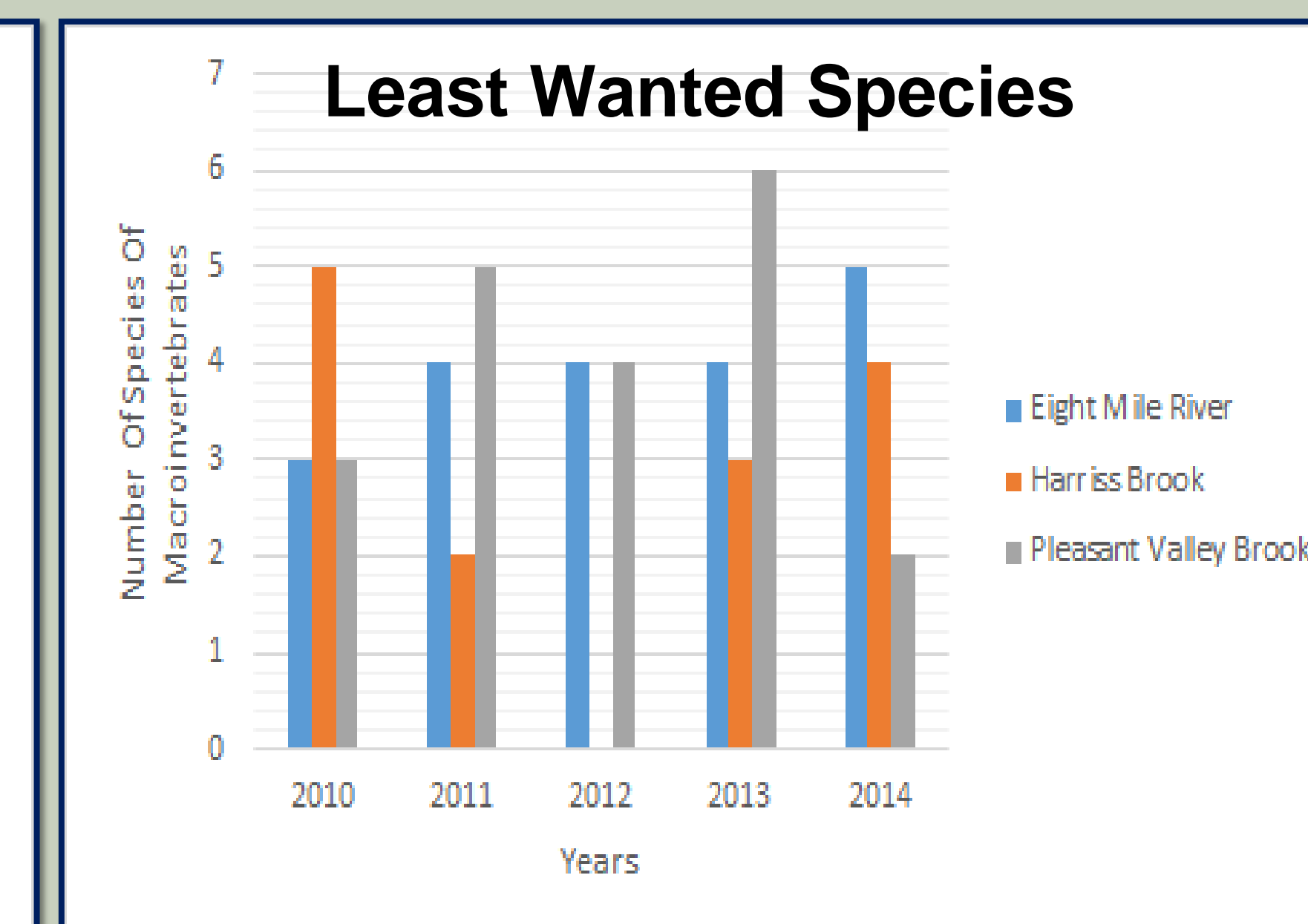
RESULTS



- #### Most Wanted Results
- Eight Mile River increased
 - Harris Brook decreased
 - Pleasant Valley was more or less consistent
 - Overall was more or less consistent suggesting little variation in water quality



- #### Moderately Wanted Results
- Eight Mile increased
 - Harris Brook increased
 - Pleasant Valley Brook increased
 - All streams increased showing consistency



- #### Least Wanted Results
- Eight Mile River increased slightly
 - Harris Brook decreased at first but grew back
 - Pleasant Valley Brook increased overall
 - Overall was more or less consistent

CONCLUSIONS

To conclude, our hypothesis of thinking that the water quality would decrease was not observed. This is shown because overall there was more or less consistent amount of "most wanted" species. Although all rivers in 2013 did decrease significantly in the number of "most wanted" species, indicating a decrease in water quality. This shows that the water quality may have been affected by human activities such as poor farming practices or could have been because the draught, but made a quick recovery. The hypothesis was also wrong by the increase in the amount of moderately wanted species of macroinvertebrates. The increase shows that there is a more diverse population for each stream which may indicate better quality. The study also indicated that there was a decrease in the amount of least wanted species of macroinvertebrates. This shows an increase in water quality because those species can live anywhere, and a lack of them means they have been less common and it shows a bigger variety of the species we want to see more of.

ACKNOWLEDGEMENTS

I am very happy that I took part in this academy and got to participate in all of the fun activities and to have learned so much. I want to give a huge thanks to everyone I met at the NRCA field experience, peers and teachers, my parents, and especially my biggest helpers in Laura Cisneros and Diba Khan-Bureau without whom this would have been impossible.

REFERENCES

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