Past to Present: A Comparison of the Composition and Abundance of Macroinvertebrates in the Upper Mettawee River

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Introduction

The Mettawee River is an important part of the southern portion of the Lake Champlain Watershed. Ongoing collection of both water samples and macroinvertebrates over the past five years has established a baseline for current studies. The diversity and ubiquitous nature of benthic macroinvertebrates make them ideal indicators for changes in water chemistry, sedimentation, and other factors. The relatively long life span of these organisms allows for an assessment of stream conditions over a longer period of time than a snapshot proved by water chemistry methods. Given recent major storm events in the past few years, the researchers expected a decrease in metrics associated with the benthic community.

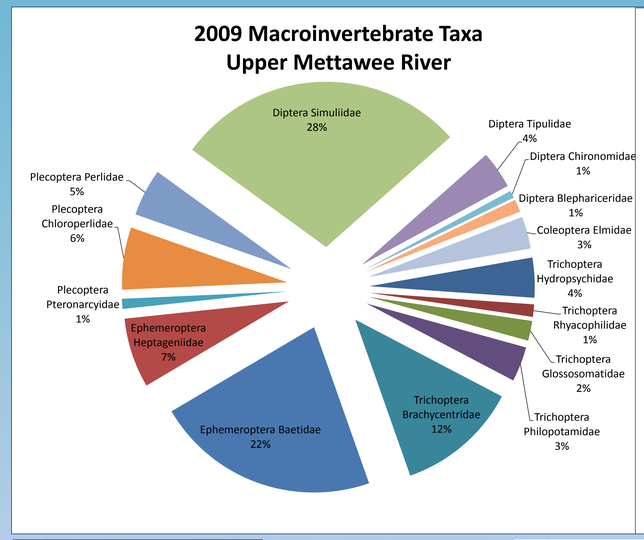
Methods

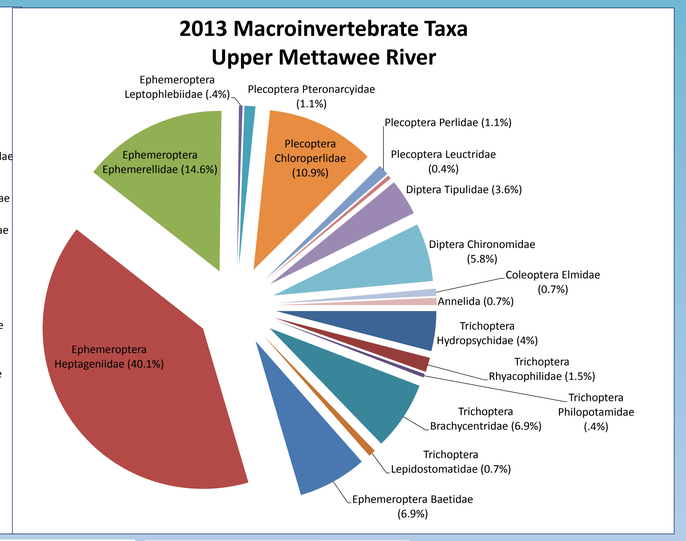
Invertebrates were collected during the early-Fall index period at a riffle site in accordance with the VT DEC Field Methods. 4 samples were identified to the specific taxonomic Order and Family. Insects were organized according to their function feeding groups. Other biometrics of water quality were applied for comparison purposes. These values were compared to 2009 results.

Metric Values Calculated From Macroinvertebrate Data Collected From the Upper Mettawee River

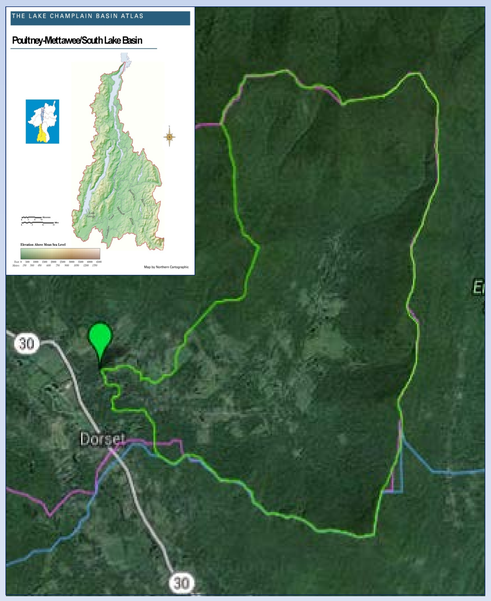
Metric	2009	2013
Density of Insects / Sample	411	274
# Taxa[1] / Sample (Richness)	15	17
EPT[2] Index	10	13
EPT/EPT + Chironomidae Index	.99	.94
% EPT / Sample	65	91
Hilsenhoff Biotic Index[3]	3.71	2.97

All metrics indicate high water quality during sampling time 2009 and 2013. The density of insects decreased, however the number of taxa went up in 2013 when compared to 2009. The EPT Index, the percent EPT per sample, and the HBI indicate an improvement in water quality from 2009. The EPT/EPT + Chironomidae Index decreased to a small degree. These metrics indicate that the basin that feeds this portion of the Mettawee River continues to provide water of high quality.

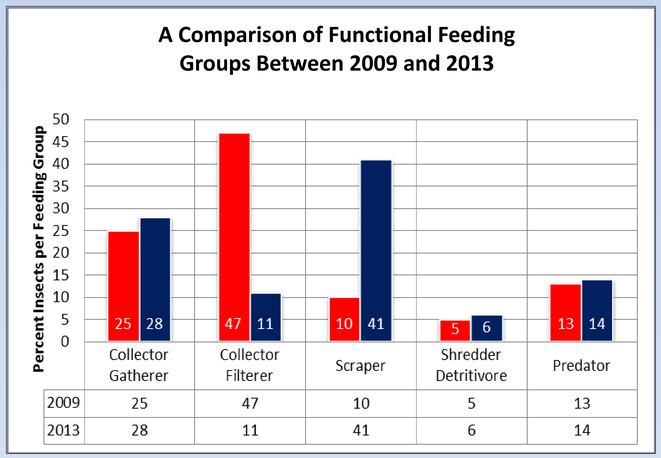




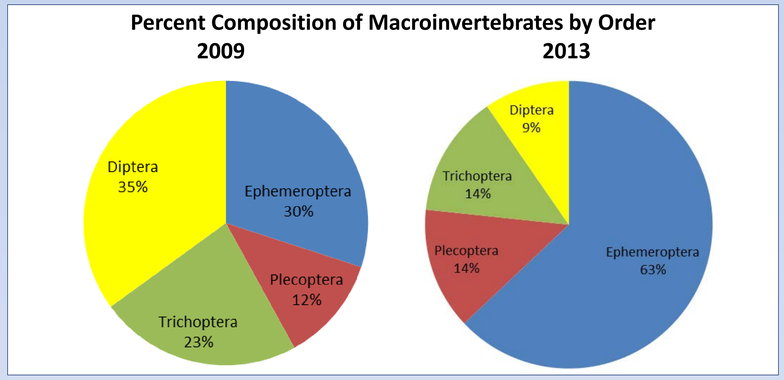
No insects of the family Simuliidae were detected in 2013 samples. This is a major contributor to the increase in the percent EPT in the 2013 sampling. A substantial increase in the percent Heptageniidae was seen in the 2013 samples. A notable increase in the percent Diptera Chironomidae was also seen in the 2013 samples. There was a large decrease in Ephemeroptera Baetidae observed as well. There were no Ephemerillidae present in the 2009 samples, though this family made up almost 15% of the 2013 sampling.



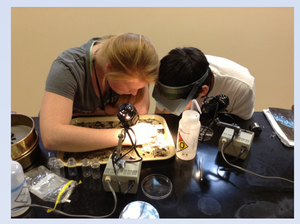
Land Area, approximately 25km^2 , that serves as the watershed for the Upper Mettawee River Peace Street sampling site.



There has been a significant decline in Collector Filterer populations between 2009 and 2013. Meanwhile , the scraper population has increased substantially. Other feeding groups have remained constant. Since Collector Filterers depend upon FPOM for food, there may have been a decrease in this particulate matter. The increased prevalence of scrapers suggests higher algae presence on the stream bottom.



The relative composition of Dipterans dropped significantly between 2009 and 2013. Trichoptera composition also showed a decrease. Alternatively, the Ephemeroptera percent composition increased during this time.



Conclusion

Based on the biological data accumulated in this study:

- Water quality continues to be excellent.
- Most notable changes in the metric values can be seen with improved EPT and Hilsenhoff Biotic Index values.
- It is difficult to determine the background causes for these shifts.
- A significant shift in percent composition of insects is noted with an increase in the Order Ephemeroptera and a decline in the Order Diptera.
- Consequently, a shift in feeding groups can be observed with a decrease in collector filterers and an increase in scrapers. This may indicate a decrease in FPOM and an increase in algae along the stream bed.
- The results generated in this study will continue to provide a valuable baseline for future water quality studies in the Upper Mettawee River.

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