Effects of Widespread Trace Chemicals on Aquatic and Riparian Communities in the Portage River Watershed

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Background

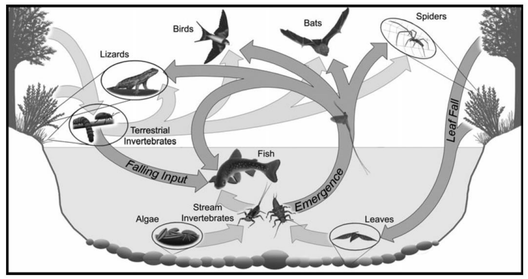


Fig. 1 "A generalized diagram showing reciprocal flows of invertebrate prey and inputs of plant material (dark arrows that have direct and indirect effects in stream and riparian food webs." Baxter *et al.* 2005. ©2005 Blackwell Publishing LTD, *Freshwater Biology*, 50, 201-220.

This pilot study examines invertebrate community composition in the Portage river tributaries and physical and chemical properties of the river for further research direction.

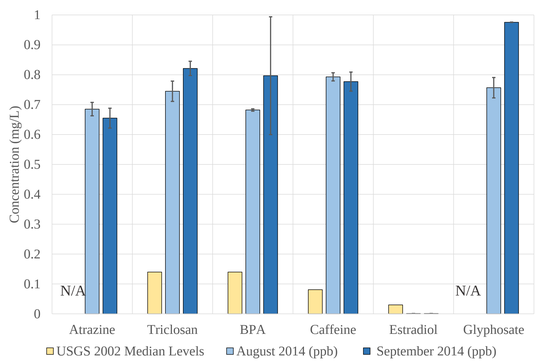


Fig 2. Concentrations of six trace chemicals in Portage River in NW Ohio in August and September 2014. The median level of these chemicals in United States rivers from the early 2000's is also shown (USGS). The Portage river had levels of Atrazine that can affect American Leopard Frogs (Hayes 2001), Triclosan that can affect algae and crustaceans (Chalew, 2009), and Estrdiol that can affect fathead minnows (Ankley, 2006).

Question: What factors influence invertebrates along the Portage river?

Methodology

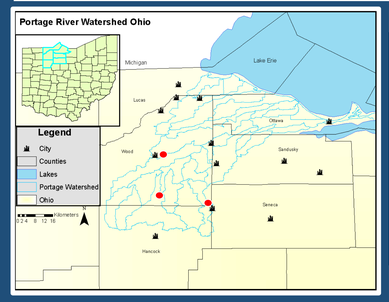
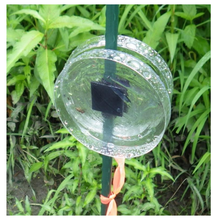


Fig. 3. Map of the Portage river Watershed and the 3 paired sites downstream and upstream of wastewater treatment plants in the tributaries.

Macroinvertebrate Sampling

Pitfall Trapping

Sticky Pole Trapping



Sweep Net Sampling

Physical/Chemical Measurements

Sample Analysis

Identifying Invertebrates

Vegan Package

Results & Discussion

Pitfall Trapping

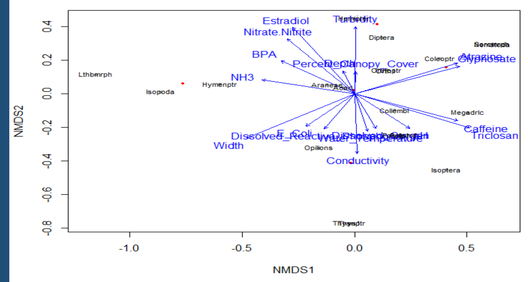


Fig. 4. This nonmetric multidimensional scaling plots displays most of the measured predictors of the insect distribution, of animals captured with pitfall traps and categorized by order.

Sticky Pole Trapping

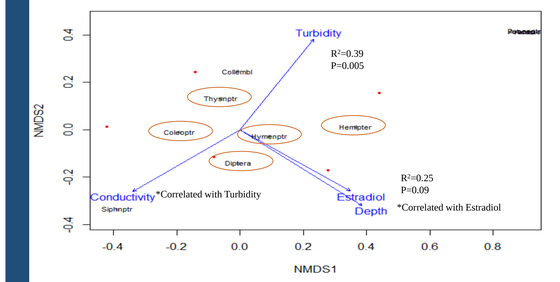


Fig. 7. This nonmetric multidimensional scaling plot displays the significant predictors (at $\alpha = 0.1$) of the insects distribution, of animals captured with sticky traps and categorized by order.

Macroinvertebrate Sampling

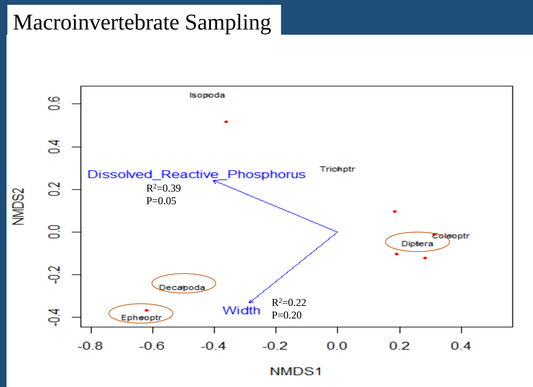


Fig. 5. This nonmetric multidimensional scaling plot displays the significant predictors (at $\alpha = 0.1$) of the benthic macroinvertebrate distribution, of animals captured with D nets and categorized by order.

Sweep Net Sampling

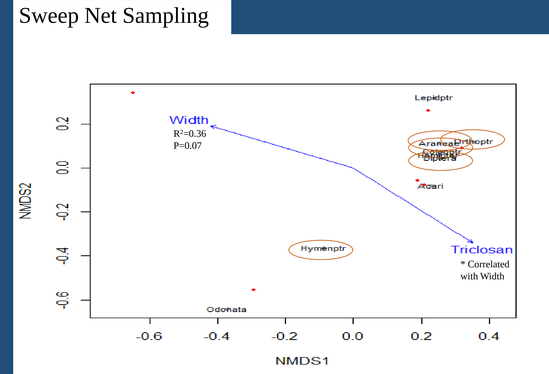


Fig. 8. This nonmetric multidimensional scaling plot displays the significant predictors (at $\alpha = 0.1$) of the insect distribution, of animals captured with sweep nets and categorized by order.

Pitfall Trapping

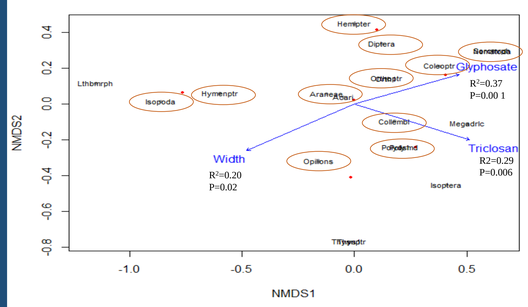


Fig. 6. This nonmetric multidimensional scaling plots displays the significant predictors (at $\alpha = 0.05$) of the insect distribution, of animals captured with pitfall traps and categorized by order.

Conclusions

Important Chemical Factors:
Triclosan, Estradiol, Dissolved Reactive Phosphorus, Glyphosate

Important Physical Factors:
Width, Depth, Turbidity, Conductivity

Invertebrates Strongly Influenced by Factors:
Crayfish, Mayflies, Flies, Beetles, Ants

Future Research: More sampling with a focus on chemical mixtures.