



Velocity effects on the spatial patterning and density of a caddisfly in the Chippewa River

Mallory Immerfall

Department of Biology, University of Wisconsin-Eau Claire, Eau Claire, Wisconsin, 54701

Faculty Advisors: Dr. Todd Wellnitz and Dr. Eric Merten

Introduction

Larvae of the caddisfly *Leucotrichia* live in silk cases attached to hard surfaces in streams (McAuliffe 1982). They construct cases in summer, overwinter as larvae, and emerge as adults the following June or July. *Leucotrichia* larvae are very territorial. Territory size is determined by the availability of benthic algae, which serves as food for the larvae (Hart 1985a). Larvae spend about half their time reaching out of their case to graze on the algae surrounding their case (Hart 1985b).

In this study I examined the relationship between near-bed current velocity and the spatial patterning of *Leucotrichia* on the Chippewa River streambed. I measured larval case density, the spacing between cases, and the angle of case orientation relative to flow.



Leucotrichia larval cases in the Chippewa River and an illustration of a *Leucotrichia pictipes* larvae (at right).



Materials and Methods



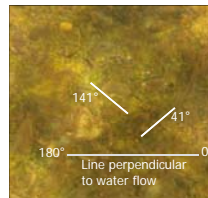
Section of the Chippewa River used in the study. Samples were collected along a transect line running perpendicular to shore.



Near-bed current was measured at 1 cm spatial resolution.

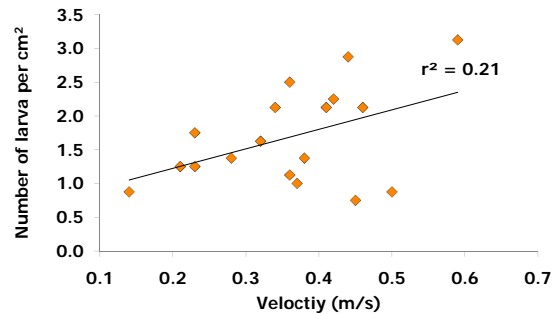


After velocity was recorded, a photograph of the streambed was taken so measurements of larval density, spacing and orientation could be made.

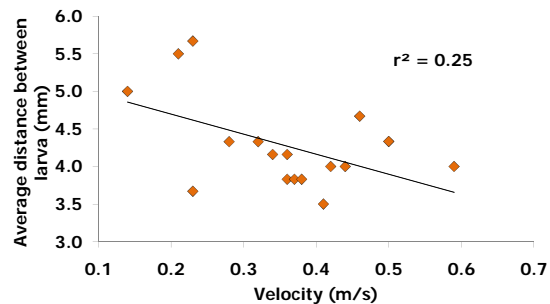


Photographs were analyzed to determine case density, distance to nearest neighbor, and angle of larva relative to flow direction.

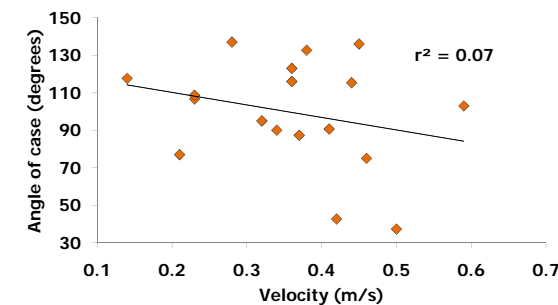
Results



Velocity has a marginally significant ($p=0.056$) impact on larval case density. Average density for the study was 1.28 cases/cm².



Velocity had an inverse relationship with case spacing ($p=0.04$). Higher velocity decreased the distance between cases.



Velocity had no effect on case orientation ($p=0.29$).

Conclusions

- ✓ Near-bed current velocity did influence *Leucotrichia* distribution on the Chippewa River stream bed.
- ✓ The higher the velocity, the more larvae were present, and the closer they were to each other.
- ✓ The direction of near-bed current did not influence the orientation of *Leucotrichia* cases.

Discussion

Understanding how stream velocity affects the spatial patterning in *Leucotrichia* is important not just for understanding how their territories are shaped, but the influence these insects have on their communities. *Leucotrichia* have been shown to have a distinct effect on the types of algae present around their cases (Hart, 1985a). *Leucotrichia* remove blue-green algae but do not ingest it, so other preferred algal types can grow. By understanding how velocity affects the distribution and density of *Leucotrichia* we can better understand what algal types will be found at each velocity where *Leucotrichia* are present.



Literature cited

- Hart, D. D. 1985a. Causes and consequences of territoriality in a grazing stream insect. *Ecology* 66.2: 404-14.
- Hart, D. D. 1985b. Grazing insects mediate algal interactions in a stream benthic community. *Oikos* 44.1: 40-46.
- McAuliffe, J. R. 1982. Behavior and life history of *Leucotrichia pictipes* (Banks) (Trichoptera:Hydroptilidae) with special emphasis on case re-occupancy. *Canadian Journal of Zoology* 60.7: 1557-1561.

Acknowledgments

Financial support for this project was provided by the UW-Eau Claire Center of Excellence for Faculty and Undergraduate Student Research Collaboration. I would also like to thank UWEC undergraduate Nicole Leighton who contributed to this project.