Shadflies: What an animal with no mouth can tell us about Lake Nipissing's Environment

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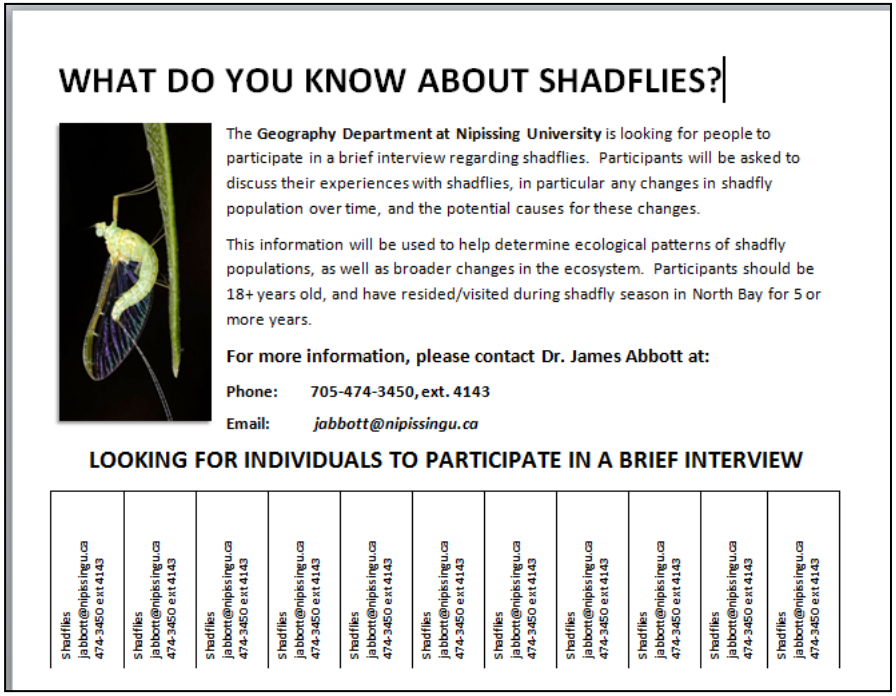
Nipissing Shadfly Research (2009)

Collected largely qualitative data on:

- perceptions of change in shadfly abundance
- Cause-effect linkages



WHAT DO YOU KNOW ABOUT SHADFLIES?

The **Geography Department at Nipissing University** is looking for people to participate in a brief interview regarding shadflies. Participants will be asked to discuss their experiences with shadflies, in particular any changes in shadfly population over time, and the potential causes for these changes.

This information will be used to help determine ecological patterns of shadfly populations, as well as broader changes in the ecosystem. Participants should be 18+ years old, and have resided/visited during shadfly season in North Bay for 5 or more years.

For more information, please contact Dr. James Abbott at:

Phone: 705-474-3450, ext. 4143

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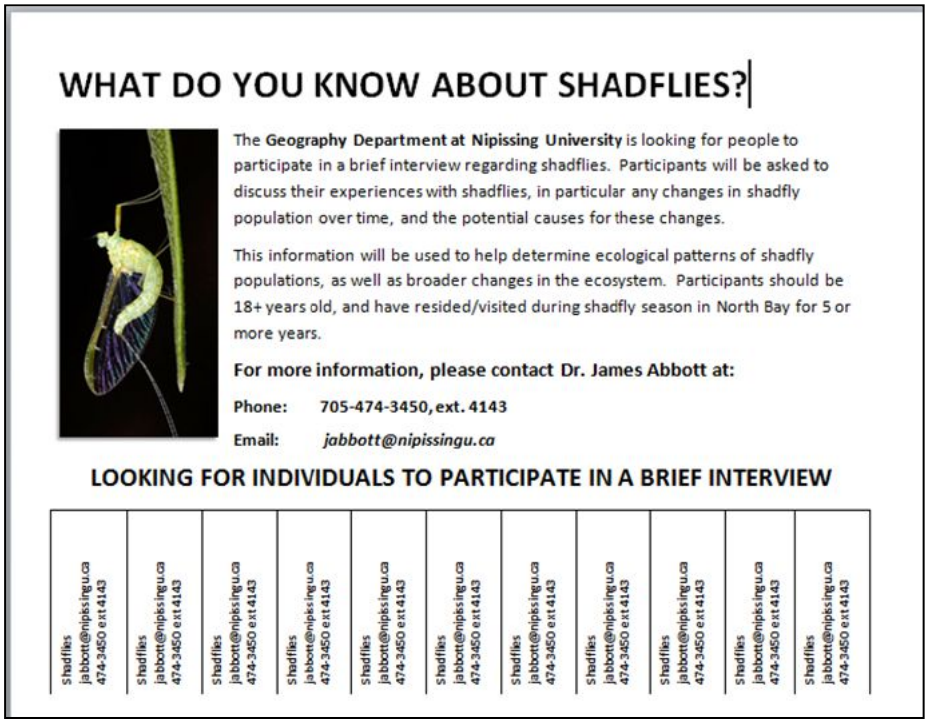
LOOKING FOR INDIVIDUALS TO PARTICIPATE IN A BRIEF INTERVIEW

Shadflies jabbott@nipissingu.ca 474-3450 ext 4143

Findings

- Some interviewees reported change in abundance
- Difference in hatching times between North Bay and Sturgeon Falls



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Role as indicator species for emerging environmental trends

- Temperature
- Water levels
- predator-prey relationships

Role of Artificial Light

Role of terrestrial habitat

Role of light in distribution of shadfly adults and eggs

- Reflective surfaces and different polarizing light properties

Horváth, G. et al. (2010) *Conservation Biology* 24(6) pp. 1644 -53

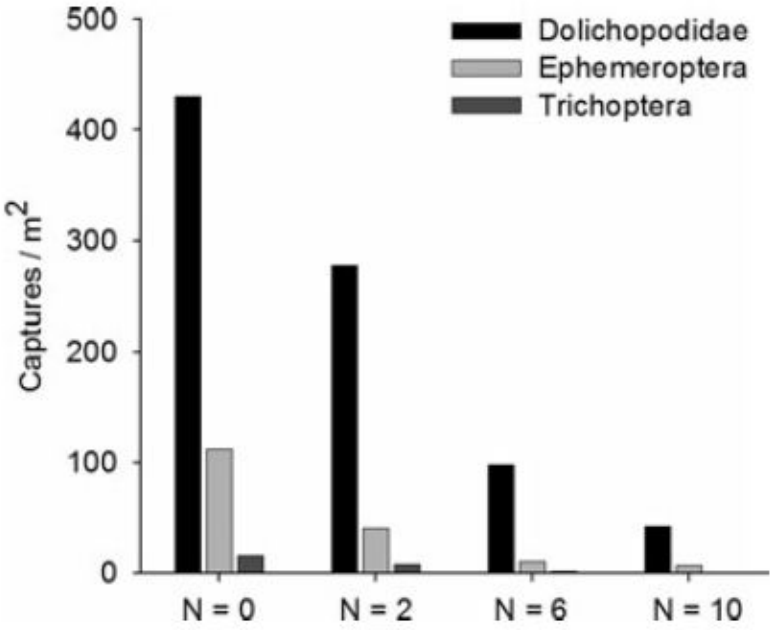


Figure 4. The surface density (captures per square meter) of polarotactic dolichopodid (Diptera), mayflies (Ephemeroptera), and Philopotamus *(Trichoptera) trapped by a highly and horizontally polarizing sticky surface with different numbers* (N) *of orthogonal white strips (Fig. 3).*

Role of flat surfaces in distribution of shadfly adults and eggs

- Smooth dark surfaces, such as asphalt attract shadflies and show increased egg deposition

Kriska, G. et al. 1998. *J. of exp. biol.* 201(15) pp. 2273 -86

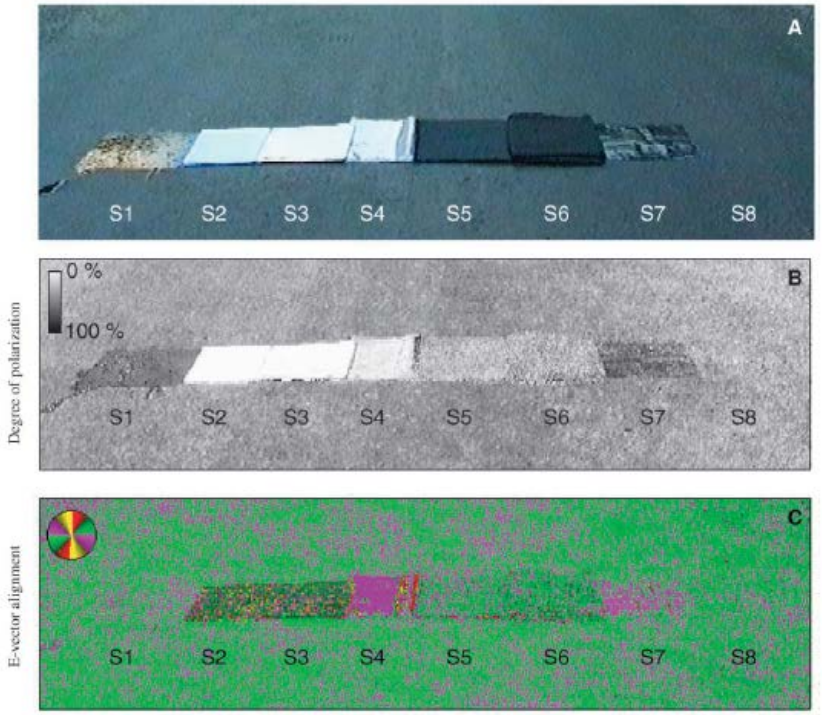


Fig. 4. The reflection–polarization characteristics of eight different test surfaces measured using video-polarimetry. The scene was illuminated by skylight from above after sunset and recorded from a direction of view of the camera of 70 ° with respect to the vertical. The rectangular pieces of the test surfaces were laid on a dry asphalt road, a small rectangular area of which (S1) was moistened by water. S1, wet asphalt surface; S2, matt white cloth; S3, shiny aluminium foil; S4, shiny white plastic sheet; S5, matt black cloth; S6, slightly shiny black cloth; S7, shiny black plastic sheet; S8, dry asphalt surface. (A) The colour picture of the scene as seen through the video-polarimetry camera. (B) The pattern of the degree of polarization of the scene. (C) The pattern of the E-vector alignment of the scene. Other details are as in Fig. 2.

Terrestrial Vegetation

- Correlation between quality of terrestrial vegetation and mayfly genetic diversity

Alexander et al. (2011) *Freshwater Biology* 56(7), 1456-1467.

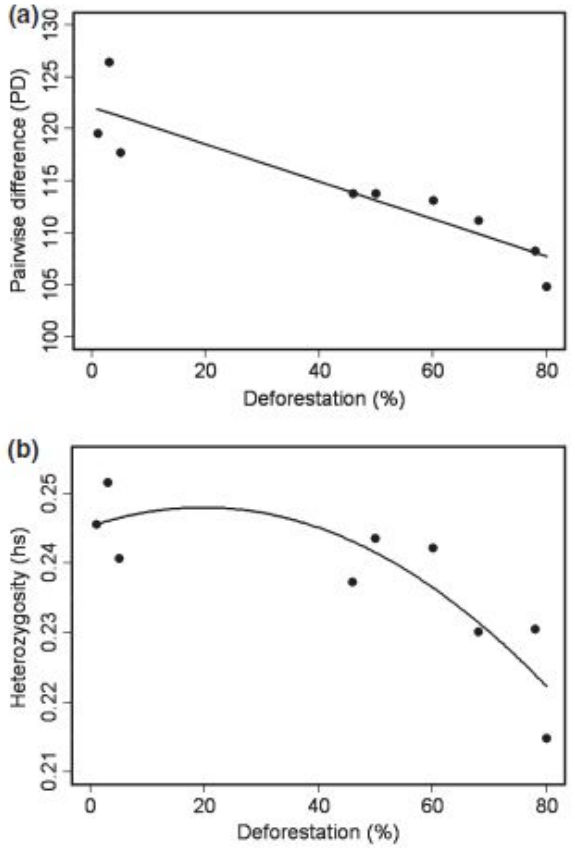
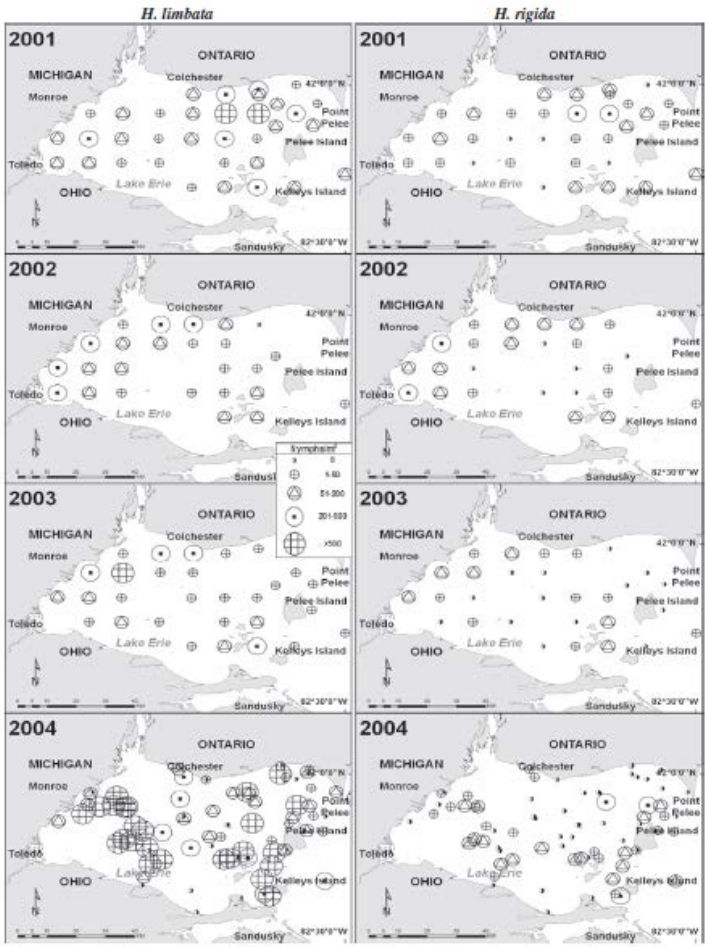


Fig. 2 Linear regressions of genetic diversity (PD, hs) on catchment deforestation (*def*). A, pairwise distance (*PD*): adj.$R^2 = 0.81$, $P < 0.001$; $\hat{Y}_{PD} = 122.09 - 17.93^{*}def$. B, heterozygosity (*hs*): adj.$R^2 = 0.67$, $P = 0.01$; $\hat{Y}_{hs} = 0.2453 + 0.000279^{*}def - 0.000007^{*}def^2$.

Shadfly abundance, distribution or both?

- Abundance two mayfly species nymphs in Lake Erie

- Differences in tolerance to hypoxia and overwintering success



Green, E. et al., (2013) *J. Great Lakes Res.* 39(2): pp.280 -286

Role in Phosphorous Cycle & the 'Trophic Paradox'

- Decreasing phosphorous loads combined with increased phosphorous concentrations

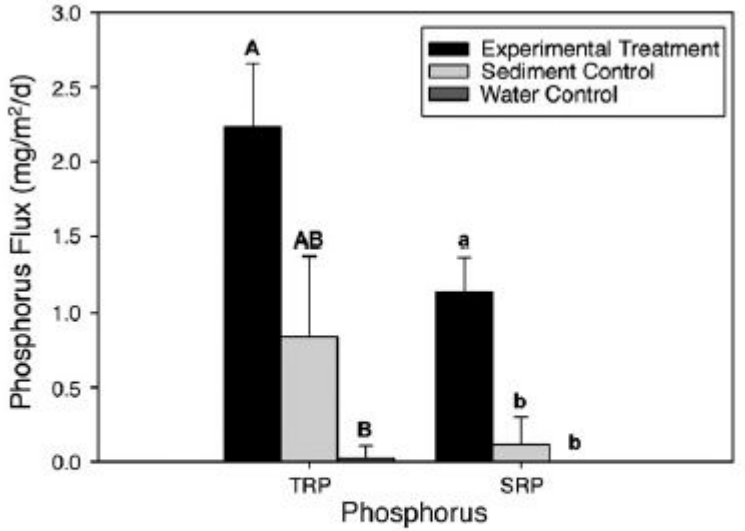


Fig. 3. Flux (mg/m^2/day) of total reactive phosphorus (TRP) and soluble reactive phosphorus (SRP) over a 168 h period. Flux (calculated as in Steinman et al., 2006) is based on difference of final and initial phosphorus concentrations. Values reported are mean ± 1 S.E. Letters represent statically significant differences among treatments based on Tukey comparison ($\alpha = 0.05$).

Chaffin, J. and D. Kane. 2010. *J. Great Lakes Res.* 36:1 pp.57 - 63.

Blue-green algae blooms

- Effect of microcystin toxin on survival at different life stages

Smith et al. (2008) *Environ. Toxicol.* 23(4) pp. 499 -506

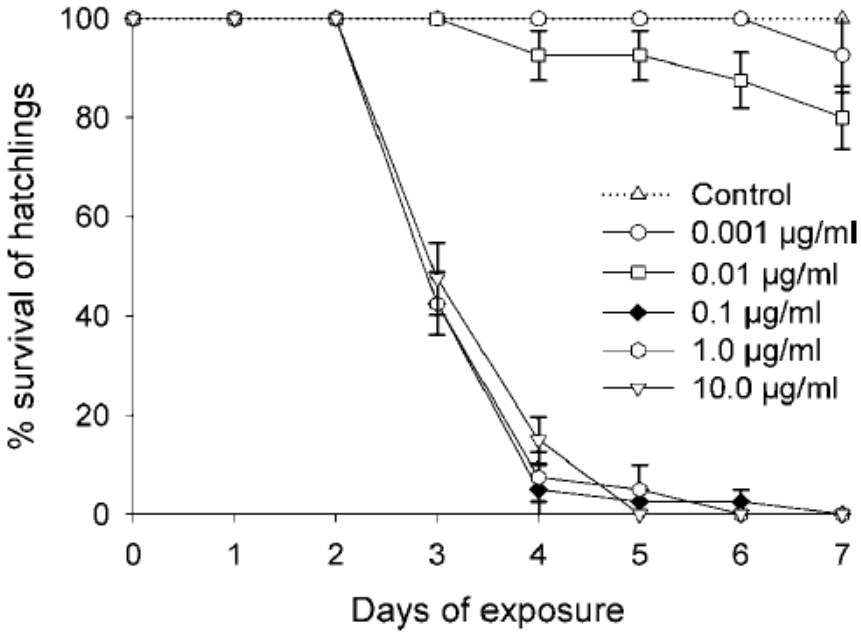


Fig. 2. Percent survival of *Hexagenia* hatchlings when exposed to a range of microcystin-LR (MC-LR) concentrations, 0–10.0 μg mL^{-1}, for 7 days (n = 5, SE bars). Exposure to high levels of MC-LR caused significant mortality of hatchlings after 48 h.

Three questions
and ideas to address them

1. To what extent does shadfly **abundance** experience **interannual variability**?

Three questions
and ideas to address them

2. What factors affect the **terrestrial distribution** of adult shadflies?

Three questions
and ideas to address them

3. What role do the aquatic life stages of shadflies play in Lake Nipissing's **phosphorous cycles**?

Thank you

Sources

- Horváth, G. et al. (2010) Conservation Biology 24(6) pp. 1644 -53
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