

LAKE SIZE PREDICTS VARIATION OF PARASITE PREVALENCE AND INTENSITY



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Introduction

Parasitologists and ecologists alike have become increasingly interested in the patterns (and underlying processes) of parasitism over space. While theory, along with some empirical studies, suggests that parasitism increases with increasing system size or diversity, few studies compare the prevalence or intensity of particular parasites in host populations across a spectrum of system sizes. Here we examine the parasite communities associated with sunfishes (*Lepomis spp.*) across a gradient of lake sizes ranging from 5 acres to 6000 acres, in eastern Ohio. Because of its prevalence in these systems, we focus on infections by the trematode *Posthodiplostomum minimum*, which utilizes sunfishes as 2nd intermediate hosts (as encysted metacercariae). Additionally, infections by both encysting (larval) and unencysted (sparganum) cestodes were recorded.

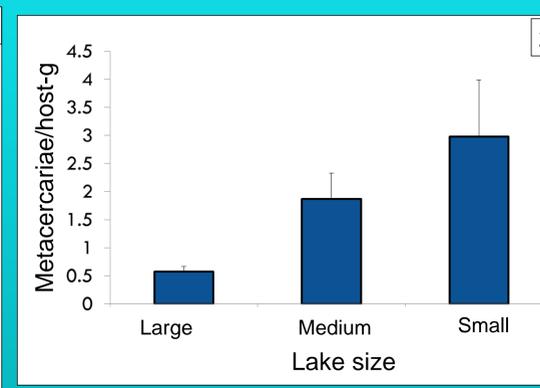
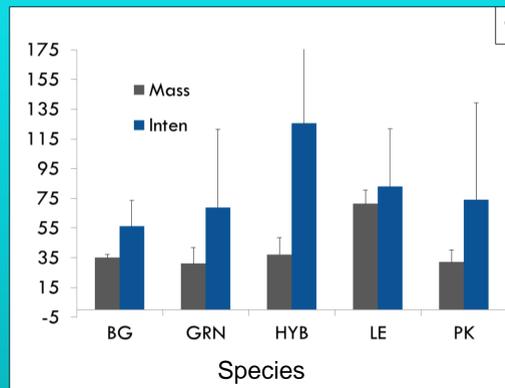
Objectives

- To sample sunfishes and their parasite communities across a spectrum of lake sizes
- Examine relationships between parasite community diversity, prevalence, intensity and lake size, as well as fish size and species

Methods

- Sunfish at each of 8 lakes (ranging from 5 to 6000 acres) in Eastern Ohio were caught (86 total) by Dr. Wayne Rossiter using bait-loaded crab traps left submerged for approximately 12 hours from dusk to dawn during the month of August. Fish were euthanized by pithing, and frozen.
- Fish were identified, weighed, measured, and searched for internal helminths via parasitological dissection.
- Infections residing in the heart, liver, and intestines were observed under a dissecting microscope and parasite species and numbers recorded.

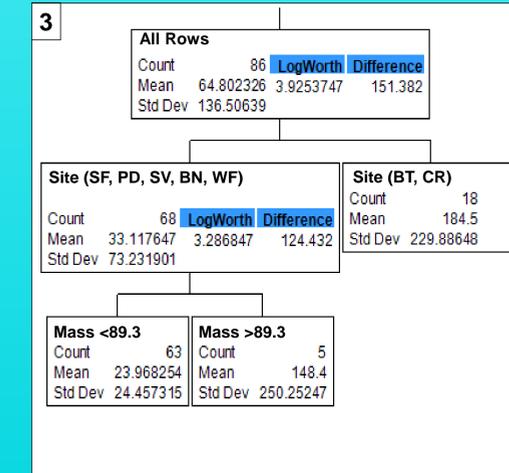
Results



Results

Eighty-six sunfish were collected in all, and all individuals were infected by *P. minimum*. Surprisingly, no acanthocephalan or nematode parasites were observed, though many are recorded for this region. However, cestodes were more prominent in larger lakes (data not shown). Strikingly, we observed a strong negative correlation between infection intensity of *P. minimum* and lake size, even when correcting for differences in mean host size across systems (Fig. 2). While not statistically significant, hybrid sunfishes tended to be more heavily infected (Fig 1), and intensity was not correlated with fish size.

Results (cont')



Use of Classification and Regression Tree (CART) analysis revealed that site (lake) size was the most powerful predictor with infection intensity as the response variable (Fig. 3). A Multivariate Analysis of Variance (MANOVA) supported that site was the best predictor of infection intensity by *P. minimum* ($F = 5.77, p = 0.0004$). No other predictor variable was significant.

Conclusion

We observed a strong negative relationship between lake size and infection intensity by *P. minimum*. We speculate that this might be a consequence of the increased edge habitat-to-volume ratios seen in smaller systems. Sunfish suspend in complex habitats associated with edges and shorelines. Both snail and bird hosts for this parasite also associate with these edge habitats, and smaller lakes may produce higher contact rates among hosts, leading to increased infection loads.

References

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