Wetland Connections: The Correlation of Parasites between Ducks and Snails Collected from Mead Wildlife Area

Nicole Wagner, Gina Magro, Elizabeth VanDomelen, Roiya Meyer, Kao Lee Thao, Robert C. Jadin, Sarah A. Orlofske

Introduction

Wetlands provide important habitat for diverse species, including wetland birds and waterfowl (Halls 1997). Waterfowl are associated with some of the most diverse and abundant trematode communities (Hechinger and Lafferty 2005). Larval trematodes are ingested by the final host where they develop into adults and produce eggs, completing the life cycle (Poulin and Cribb 2002). Because of the connection of parasites to diet, parasite-host interactions can give insight into community dynamics, ecos ystem health, and trophic interactions (Hechinger and Laffer ty 2005). Currently, there are no published studies looking at parasite communities in central Wisconsin wetlands. Understanding parasite communities and how they can interact with the host communities in an ecosystem can provide important information that will lead up to better manage these habitats (Costello et al. 2013; Dougherty et al. 2016).

Objective

Compare parasite communities of both snails and waterfowl collected from the Mead Wildlife Area to detect parasites that indicate species presence and waterfowl diets.

Methods

Snail Collection

- D-frame net sweeps around wetland perimeter from three sites (Rangeline, Smoky Hill, and Teal Flowage at Mead Wildlife Area)
- Sept 12 2021, prior to the start of WI Waterfowl Hunting season
- 76 snails collected of two species *Physella* and *Planorbella*
- Snails were shed for cercariae, a larval stage of the parasite Cercariae were identified using 100-400X magnification
- Samples of cercariae were preserved for protein and DNA analysis

Waterfowl Sampling

- 11 hunter donated waterfowl from Rangeline, Smoky Hill, and Eau Plaine Flowage, which is near Teal Flowage.
- Recorded species, age, sex and date of harvest, and length of wing, tail, and body
- Specimens were dissected using standardized protocols (Lutz et al. 2017)

Parasite Collection

- Organs and other tissues were separated individually to collect endoparasites
- Parasites were morphologically identified and counted using 10-60X magnification
- All parasites were preserved in 80% ethanol and labeled.

Results

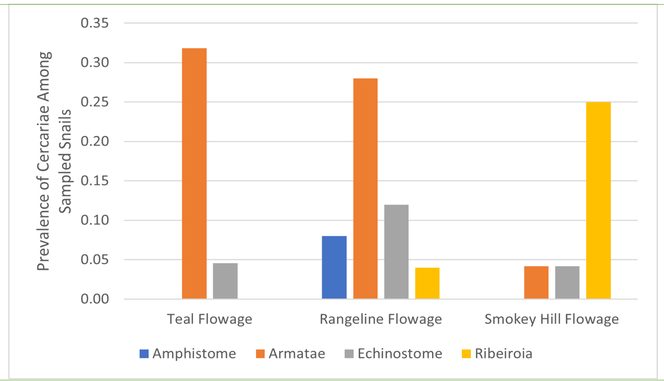

Fig. 1. Prevalence of infection within snails by cercaria type at the three collection sites. Four total cercaria types were detected in snails from Mead Wildlife Area.

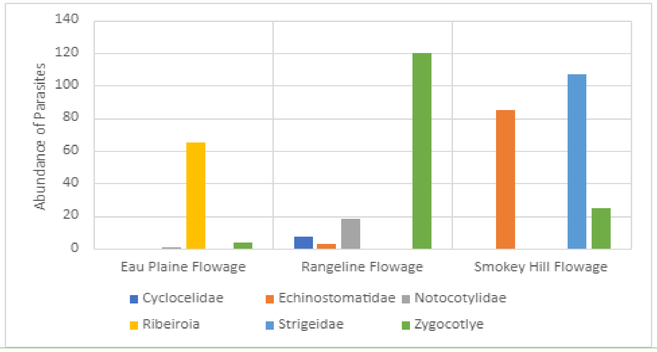

Fig. 2. Abundance of parasites by taxonomic group within waterfowl at the different sites. Six total trematode taxa were detected in waterfowl from Mead Wildlife Area.

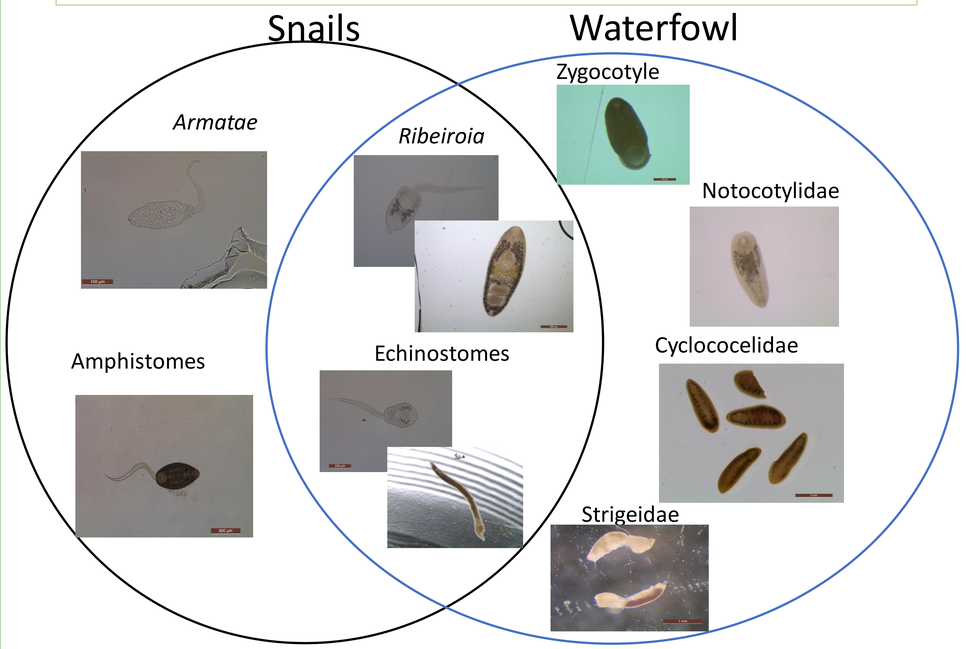

Fig. 3. Comparison of parasite taxa found within snails and waterfowl. Parasites in the taxonomic family Echinostomatidae and the genus *Ribeiroia* are found in both host communities as larval stages in snails and adults in waterfowl.

Discussion

Snails

- 4-12% of snails were infected with echinostome cercariae (Fig. 1)
- Some of the infections were caused by parasites not found in or not specific to waterfowl.

Waterfowl

- Six trematode taxa in waterfowl including *Zygocotyle lunata* which is Pathogenic (Fig. 2, McDonald 1981)
- *Ribeiroia* sp. is potentially pathogenic based on information about closely related species. (McDonald 1981)
- Molecular data is needed for species level identifications for *Ribeiroia*, Notocotylidae, and Echinostomatidae to see whether pathogenic species are present.

Parasite Comparison

Waterfowl and snail parasite communities at Mead Wildlife Area are dominated by a few generalist parasites and share only two parasite taxa (Fig. 3). Echinostomes are some of the most prevalent flatworms in waterfowl (20.2% prevalence in our study) but can also be found in other birds and mammals (Detwiler et al. 2010). Sites that contain Ribeiroia and echinostomes may indicate more use by waterfowl than sites that do not. Parasites may be found in snails but not waterfowl due to different host populations in the area. Marsh birds or songs birds are likely supporting the population of Armatae, a morphotype representing several potential species commonly found within these types of birds (Ellis 1963). Parasites may be found in waterfowl that are not present in the snails because of migration (Hannon et al., 2016). Migration allows waterfowl to ingest different parasites at other locations, which contain different parasites populations than the ones found in Mead Wildlife Area. Expanding our survey to additional wetland sites will help examine geographic patterns as well as increase our sample size. Our potentially aids in ecosystem management by demonstrating the presence of difficult to track, highly mobile hosts and community level interactions that indicate diet and feeding behavior (Hechinger and Lafferty 2005).

References

Costello, M. J., May, R. M., & Stork, N. E. (2013). *Science*, 339, 413-416.
Detwiler, J. T., Bos, D. H., & Minchella, D. J. (2010). *Molecular Phylogenetics and Evolution*, *55*, 611-620.
Dougherty, E. R., Carlson, C. J., Bueno, V. M., Burgio, K. R., Cizauskas, C. A., Clements, C. F., ... & Harris, N. C. (2016). *Conservation biology*, *30*, 724-733.
Ellis, C. J. (1963)*Proceedings of the Iowa Academy of Science 70*,486-492.
George W Mead and McMillan Marsh Wildlife Areas. (2022). Retrieved January 24, 2022, https://www.meadwildlife.org/about.cfm
Halls, A. J. E. (1997). In *Ramsar Convention Bureau, Gland, Switzerland* Vol. 13.
Hannon, E. R., Kinsella, J. M., Calhoun, D. M., Joseph, M. B., & Johnson, P. T. (2016). *The Journal of parasitology*, *102*, 199-207.
Hechinger, R. F., & Lafferty, K. D. (2005). *Proceedings of the Royal Society B: Biological Sciences*, *272*, 1059-1066.
McDonald, M. E. (1981). Key to trematodes reported in waterfowl (Vol. 142). US Department of the Interior, Fish and Wildlife Service.
Poulin, R., & Cribb, T. H. (2002). *Trends in parasitology*, *18*, 176-183.
Sitko, J., & Heneberg, P. (2020). *Parasitology research*, *119*(3), 935-945.

Acknowledgements

Craig Ziolkowski and Brandon Stefanski for assistance with sampling design and access to sampling locations.
UWSP Ducks Unlimited Club and generous donations by many UWSP Students
Dr. Vasyl Tkach, University of North Dakota for help with parasite identification.