

Background

Freshwater mussels are some of the most endangered animals in the US (Haag, 2012). Federal and state conservation efforts are complicated by a complex life history that requires parasitizing a host. While some freshwater mussel species can parasitize a broad range of host fish species, other mussels can only complete their life cycle by parasitizing a single species. Understanding more about how these factors influence their conservation status is an essential part of influencing their conservation going forward.

Big Questions

- Does host number impact the level of endangerment for a mussel species?
- Do different taxa of mussels have different trends in host numbers?
- Based on this information, where should we focus conservation efforts in the future?

Methods

- Expanded Illinois Natural History Survey host database with additional records from 2010-2020 from Google Scholar literature search
- Compiled host database into usable data
- Wrote R script to generate summary data for various measures, using t-tests to compare 2 groups and ANOVA for over two

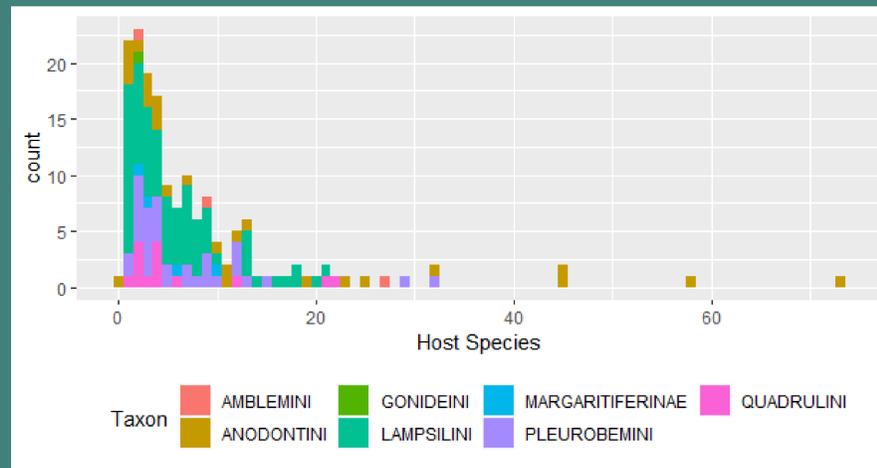


Fig. 1.
Frequency
distribution of
host number by
taxon

Fig. 2. Distribution
of host number
between mussels of
various conservation
status

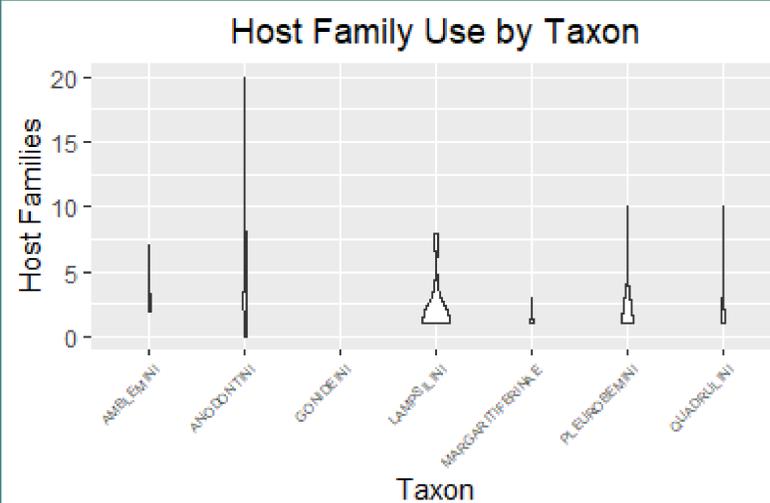
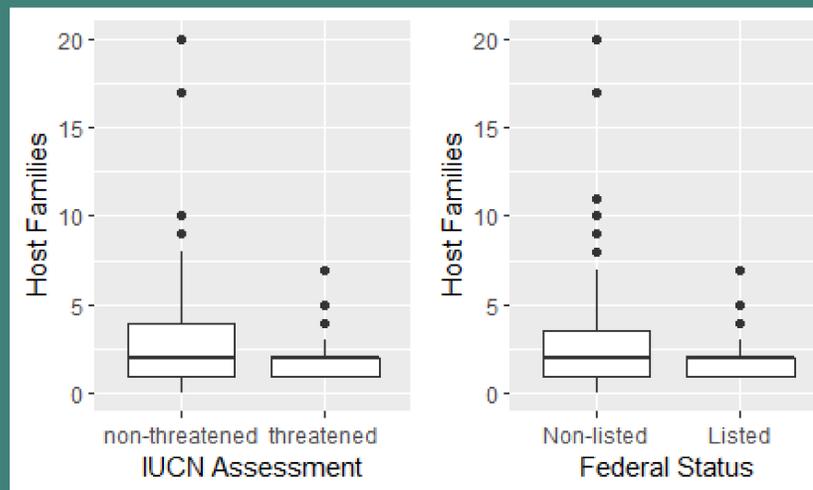


Fig. 3. Plots showing
the number of host
families for species
across different taxa

Results

- Both the IUCN and federal conservation rankings showed that, on average, mussels listed as endangered used significantly fewer host families than non-threatened mussels (IUCN, 1.94 and 3.25 respectively; $p < .01$. Federal, 2.00 and 3.21 respectively; $p < .01$)
- Anodontini was significantly different in host family numbers compared to Quadrulini ($p < .01$), Pleuroblemini ($p < .001$), and Lampsilini ($p < .001$)

Conclusion

Mussels are commonly thought of as distinct groups of host-specialists and host-generalists (Haag, 2012). However, this research supports the idea that this division is less of a dichotomy and more of a continuum (Fig. 1). The mussels that fall into the threatened categories of the conservation assessments tended to be more specialized than those that were non-threatened (Fig. 2). Some taxa also display more specialized host use than others (Fig. 3). These insights provide predictive power that can be used to help prioritize taxon-based conservation efforts.

Acknowledgements

Many thanks to the Smithsonian Institution and the National Museum of Natural History, especially to Elizabeth Cottrell, Gene Hunt, and Virginia Power. Also, a thank you to Sarah Douglass and all others involved in the creation & maintenance of the Illinois Natural History Survey Freshwater Mussel Host Database. Funding provided by the NSF. Photo by Robert Aguilar, Smithsonian Environmental Research Center. Haag, W.R., 2012. North American freshwater mussels: natural history, ecology, and conservation. Cambridge University Press