

## RE-EVALUATING THE THRESHOLD DENSITY HYPOTHESIS FOR MOOSE, DEER, AND *PARELAPHOSTRONGYLUS TENUIS*<sup>1</sup>

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### ABSTRACT

A parasite, *Parelaphostrongylus tenuis*, whose definitive host is white-tailed deer (hereafter deer; *Odocoileus virginianus*), is often cited as a significant factor contributing to moose (*Alces alces*) population declines. Although deer are asymptomatic, moose express neurologic symptoms and usually die when infected with *P. tenuis*. The life cycle of *P. tenuis* is complex and requires a secondary host (gastropods) for larvae to develop, after which point incidental ingestion by moose and deer while foraging leads to infection. Researchers posit that deer densities influence the strength of the three-way relationship among moose, deer, and *P. tenuis*, and the resulting negative impact on moose health. Despite its importance for moose and deer management, only one peer-reviewed study has evaluated the relationship between deer and moose densities, and the potential for parasite-mediated competition between the species. Using polynomial regression modeling, that study identified a deer density threshold above which moose populations declined; however, the nature of the data and apparent outliers suggest the approach used to develop that threshold may not have been appropriate. We used the data from the original study to test whether alternative models, including linear models and negative binomial models would be less sensitive to outliers and could better explain this relationship. We found no evidence in our analysis that moose density decreases as deer density increases. We conclude that while the proposed moose-deer-*P. tenuis* relationship could be partially density dependent, additional factors such as frequency dependence of disease transmission, gastropod abundance, and shared use of resources by moose and deer should also be considered.

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