

# Ticks, landscapes and thresholds of disturbance

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Clinicians are scrambling to make sense of the rising rash of ehrlichiosis infections in the United States. At William & Mary, Associate Professor of Biology Matthias Leu, a self-avowed landscape ecologist, has a thread on the problem: Follow the deer, particularly the fawns, he said.

Since 2010, Leu has been researching the effects of land use and moisture patterns on the distribution of adult and nymph lone star ticks and their preferred hosts, deer.

"We know that humans fragment the forests to build places for houses, and we also know that the fragmentation of the forests will attract deer," Leu explained. Ehrlichiosis chaffeensis, the disease he is studying, is transmitted to humans by nymphs (mid-stage ticks) that carry it in [saliva glands](#). Humans, by altering landscapes, are "increasing their chances of being exposed to the disease," he said.

Although Leu is not alone in studying the problem, many of the other research projects with which he is familiar focus on one or two years, he said. His long-term effort can help provide, he believes, a "thorough temporal analysis" that can account for the fact that the disease seems to appear in one place one year and to not be there the following year.

This year, graduate student Dylan Simpson joined Leu's research, surveying the 137 collection sites in Virginia for moisture levels, deer pellets and ticks. This season, alone, he brought 1,500 nymphs and 200 adults back to campus for analysis. Employing the resources of Oliver

Kerscher, associate professor of biology, and his molecular biology lab, Simpson has calculated the infection rates of the nymphs to be as high as 4 percent, and he has graphed their prevalence at each of the sites.

"The hypothesis goes that increasing levels of fragmentation are going to positively influence [disease prevalence](#)," Simpson said. "Yet, people like to live in these low-density suburban housing units. It's kind of the American dream."

He hopes through his research to find thresholds of housing densities below which the landscape will not be altered to the point where [deer](#) and ticks become an increasing menace.

"If we can do that, it will be beneficial because we will know that if we cross that threshold it will become more and more dangerous for humans to live in these communities," he said.

Provided by The College of William & Mary

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