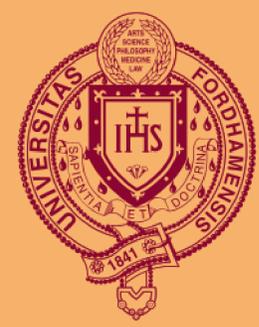


Landscape Ecology of the Asian Longhorned Tick in Westchester County, NY



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Background

- *Ixodes scapularis* is a major disease vector in the United States, spreading diseases such as babesiosis, anaplasmosis, spotted fevers, and Lyme disease.
- *Haemaphysalis longicornis* is an invasive tick species, discovered in the United States in 2017. Originally from Asia and Australia, it has since expanded into 10 states.
- *H. longicornis*' rapid spread is attributed to parthenogenesis, a phenomenon where female *H. longicornis* can reproduce without their male counterparts.
- In its Asian home range, *H. longicornis* is a known vector for severe fever with thrombocytopenia syndrome (SFTSV), and has been found to be infected with spotted fevers, Lyme, anaplasmosis, and more.
- Given how recently *H. longicornis* arrived in the United States, how quickly it reproduces, and its potential as a disease vector, there is considerable urgency behind figuring out how it behaves.
- In Westchester county, weekly sampling of sites in Yonkers along the Old Croton Aqueduct Trail have revealed hundreds of *H. longicornis* females.



Ixodes scapularis Scott Baur, 2009



Haemaphysalis longicornis James Gathany, 2018

Site Sampling:

- Six sites were selected at the Calder Center, falling into the categories of edge, forest, or field (two sites of each type). The 250 m² sites were flagged and GPS coordinates recorded.
- Each site was sampled six times, on a roughly biweekly schedule. Sampling was conducted using the drag method, with the cloth being checked every five meters. Tick species, life stage, and number were noted as the drag sampling was being conducted.
- The Yonkers site was not sampled for ticks; data from the New York State Department of Health were used instead. This site was 1,000m², and fell into the "edge" category.

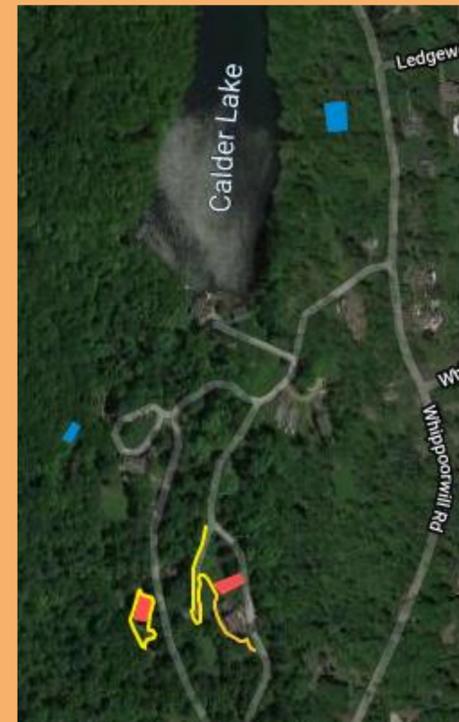


Figure 1: Map showing location of the six Calder sites. Pink areas are fields, yellow are edges, and blue are forests.

Other Measurements

- Canopy cover, soil moisture, temperature, and relative humidity were also measured at each site, although not used in subsequent analyses due to lack of statistically significant tick numbers.

Research Questions

- Where can *H. longicornis* be found on the Calder Center property?
- What kind of habitat (edge, forest, field) is it found in most often?
- How do these Calder habitats compare to the Yonkers sampling site, where *H. longicornis* is present in high numbers?

Methods

Vegetation Analysis

- A one-time vegetation analysis was conducted at each site, Yonkers included.
- Vegetation analysis consisted of placing a 0.25m² quadrat every 5 meters along a 25 meter transect at each site, and identifying every species of plant (excluding grasses) within the quadrat.

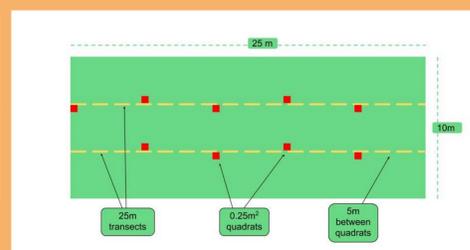
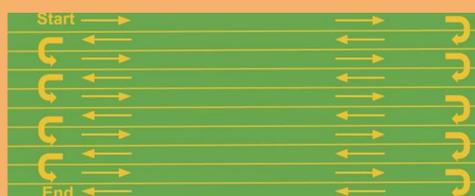


Figure 3: Diagram of transect and quadrat pattern used at each site.

Results: Site Sampling

- *H. longicornis* numbers at the Calder Center were too low to statistically analyze, though numbers rose from last year (2018)
- No clear trends in *H. longicornis* distribution could be identified at Calder.
- NYSDOH sampling of *H. longicornis* in Yonkers again showed very high numbers.
- *I. scapularis* significantly preferred wooded habitats over edge and field habitats ($p < 0.001$).

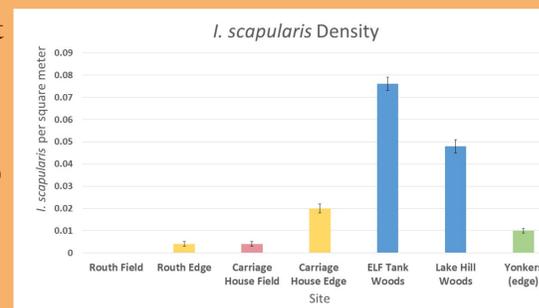


Figure 4: Graph showing *I. scapularis* found per square meter at each site. A clear preference for forest sites is evident.

Results: Vegetation Analysis

- A Shannon-Weiner diversity index was calculated for each site based on the identified species and their number. These index values were then compared between sites.
- A one-way ANOVA showed significant ($p < 0.001$) differences between the sites, and a Tukey test then showed which sites were statistically similar to each other.

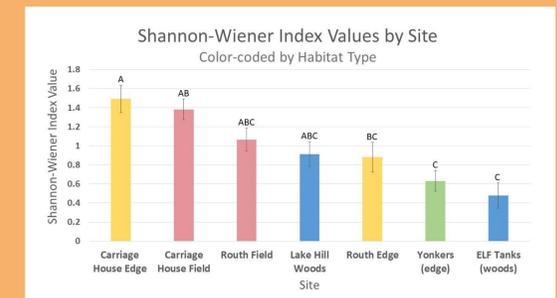


Figure 5: Graph showing statistical similarities between the various sites, as denoted by the letters above the bars. The colors correspond to site types, as in the map.

Discussion

- *H. longicornis* can be found in all three habitat types (edge, field, forest) at Calder, albeit in numbers too low to statistically analyze. It appears to be a generalist, unlike *I. scapularis*, which has clear habitat preferences.
- Calder and Yonkers are not markedly different in terms of habitat diversity, suggesting there is something else causing the vast discrepancy in *H. longicornis* population size when the two areas are compared.
- One possible explanation is host distribution. The Yonkers site is a green space bottleneck, which may host a higher population density of white-tailed deer and, subsequently, a larger *H. longicornis* population. More investigation is needed to better understand factors affecting the distribution of *H. longicornis* in Westchester County.

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Acknowledgements

- I would like to thank Dr. Thomas Daniels, Dr. Richard Falco, and Mr. Richard Rizzitello for mentoring this project, Mr. Nicholas Piedmonte for statistical assistance, the New York State Department of Health for their *H. longicornis* data, and the Vector Ecology lab staff for their guidance.