Prescribed Fire as a Tool to Reduce Tick Populations

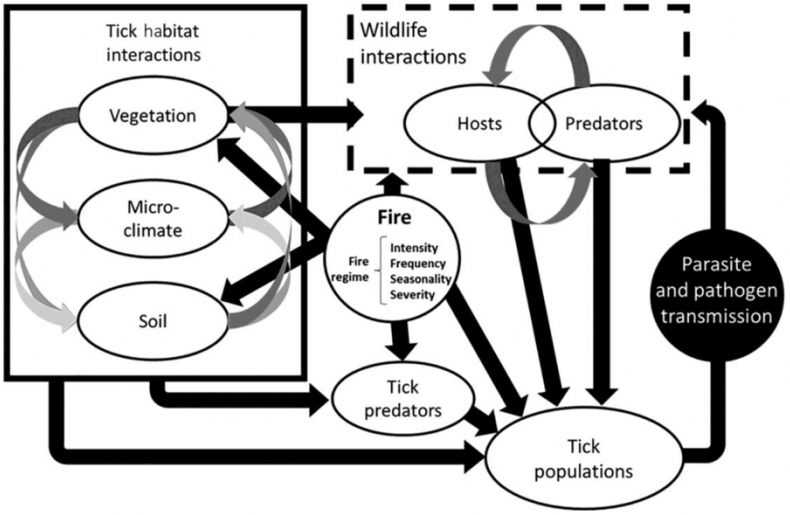
As a means of reducing rising tick populations, efforts have been focused on limiting the number of animals that are hosts for ticks and by spraying acaracides. Implementation of these efforts has been difficult as they are at a small scale and can be costly. A recent paper authored by Michael Gallagher et al. titled, "***Can restoration of fire-dependent ecosystems reduce ticks and tick-borne disease prevalence in the eastern United States***" reviews and synthesizes research on ticks, their life cycle and habitat requirements, and makes a convincing argument that landscape burning for restoration of eastern pine and oak-dominated forests and woodlands can also reduce tick populations.

Tick Habitat Requirements:

- Forest-dwelling ticks at various life stages live in moist litter and duff layers and in the upper mineral soil, thus reducing the negative impacts of excessive drying, heat, and cold that causes mortality.
- Emergence from these moist areas only occurs when the tick is hydrated and ready for a bloodmeal, in which they climb on vegetation and wait to attach to an animal host.

Mesophication and Tick Habitat:

- In the oak/pine forests that do not receive periodic fire, tick populations are high as ground layer moisture and humidity has increased due to lack of solar radiation and an increase in mesophyic species.
- Recent research has shown that the leaf litter of mesophytic species retains moisture to a much greater degree than that of oaks and pines.



Prescribed Fire Effects on Ticks:

- Laboratory studies have shown that moderately high temperatures result in tick mortality or reduced fitness.
- Ticks can be killed with the use of prescribed fire, dependent upon seasonality, intensity, and temperature. The blackened litter/duff layer can increase surface temperatures having the potential to reduce tick reproductive success and could cause mortality in fire-caused canopy openings due to increased solar radiation causing drier conditions on the forest floor.
- Recent research in longleaf pine has shown significantly reduced tick populations in frequently burned sites, compared to unburned sites, as well as a reduced risk of disease transmission.

Conclusions and Research Needs:

- The authors conclude that a 1–20 year return interval of fire can create drier and warmer surface conditions that can limit tick populations, in addition to direct mortality during the burns.
- The authors suggest that higher-intensity fires, growing-season fires, or mechanical/chemical treatments coupled with fire are likely to have a greater negative impact on tick populations.
- The authors acknowledge that direct research on prescribed fire, especially long-term application, and ticks is limited. However, they certainly present a thorough and compelling argument. Their review of the literature of re-introducing a fire regime on appropriate landscapes, highlights the potential to limit tick populations and ultimately, the transmission of several serious diseases.

The lead author is **Michael Gallagher**, is a Research Ecologist with the USFS Northern Research Station, stationed at Silas Little Experimental Forest in the Pine Barrens of New Jersey. Co-authors are Jesse Kreye, Assistant Research Professor of Fire and Natural Resources at Penn State, Erika Machtinger, Assistant Professor of Entomology at Penn State, Alexis Everland, Lead Fire Ecology Technician with Tall Timbers Research Station, also stationed in the Pine Barrens, Nathanial Schmidt, a former Master's Student at Penn State, and Nick Skowronski, a Research Forester for the USFS Northern Research Station, located in Morgantown, WV (Nick also leads the North Atlantic Fire Science Exchange), which, like CAFMS, is one of the 15 regional fire science exchanges, funded by the Joint Fire Science Program.