The Impacts of Long-term Prescribed Fire on Tick Populations & Human Disease Risk

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Ticks & Tick-borne Pathogens of the Southeastern United States

**Amblyomma americanum**
AKA lone star tick

**Associated Diseases:**
- Human monocytic ehrlichiosis (HME)
- Ehrlichiosis ewingii
- Southern tick associated rash illness (STARI)

**A. maculatum**
AKA Gulf Coast tick

**Associated Diseases:**
- *Rickettsia parkeri* rickettsiosis

**Dermacentor variabilis**
AKA American dog tick

**Associated Diseases:**
- Rocky Mountain spotted fever (RMSF)

**Ixodes spp.**
- *I. scapularis*
- *I. minor*
- *I. affinis*

**Associated Diseases:**
- Lyme disease
- Human granulocytic anaplasmosis (HGA)
Tick-borne Disease Incidence & Emergence are on the Rise

• Land Modification

• Increase in host abundance

• Climate change → Vector expansion

![Annual Cases of Lyme Disease in the US](image)
Ticks & Fire

• Tick populations reduced *immediately* after fire.

• Tick populations steadily recover over-time

• Dispute over *long-term* effects of fire on tick abundance
  • Increase or decrease in tick population &/or pathogen prevalence??

• Previous studies fail to account for variables affecting tick populations and/or do not simulate “real-world” management practices
Objectives

In southwest Georgia, determine:

1) Tick abundance & seasonality

2) Tick-borne pathogen prevalence

3) Determine the effects of long-term prescribed burning on the above
Study Design

• 21 Total Sites
  • 8 burned sites, surrounded by burned areas (BB)
  • 5 burned sites, surrounded by portions of unburned areas (BUB)
  • 5 unburned sites, surrounded by burned areas (UBB)
  • 3 control sites \(\rightarrow\) unburned, surrounded by unburned (UBUB)
Methods

• Tick surveys
  • Monthly flagging

• Microclimate & Weather

• Quarterly vegetation & host surveys
Prescribed Burns

- Burns performed as dictated by land managers
  - All dormant season burns
  - Ichauway: 2 year burns
  - WMA’s: 2-4 year burns
- All WMA’s burned during study period
Ticks Captured

• >47,000 ticks collected!!

Lone star tick by far most abundant

Black-legged tick second most common

Gulf coast tick surprisingly abundant; third most common

American dog tick fourth most common
Impact of Long-term Prescribed Burning on Tick Abundance

*One clutch of larvae was counted as a single tick.*
Impact of Burning on Tick Species Composition

Average Percent non-Larval Tick Species Composition *

- A. americanum
- A. maculatum
- I. scapularis
- D. variabilis

[Bar chart showing the impact of burning on tick species composition]
Take-Home Message

• Long-term prescribed fire reduces tick populations
  – Regardless of:
    • Burn Interval
    • Host Abundance
    • Vegetation Structure
  $\rightarrow$ ~98% reduction in ticks!!

• WHY?
  • Change in vegetation structure $\rightarrow$ hotter, drier environment

• Major reduction in disease risk for humans:
  – 0.02 infected ticks/hour in all burn treatments
  – 0.70 infected ticks/hr in UBUB
Future Research & Collaboration

Reintroduction of fire into a fire-suppressed ecosystem: What happens?
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Questions?

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