Spread of Lyme disease into NC from VA: Tick survey along the VA/NC border

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Lyme Disease
LD Emergence:

- Reforestation
- Fragmented Forested Landscape
- Habitat Generalist White-footed Mouse
- Deer Populations Thrive
Geographical LD Spread

- Highest Vector-Borne and Fifth Nationally Notifiable Disease in the Country

- Herrin and Brinkerhoff (2014) suggest LD spread is linked to expansion of vector
Possible Route of LD Expansion

- Lantos et al. 2015
  - Cluster analysis of Reported LD Cases in Virginia
  - Years Covered 2000 – 2014
- Disease cluster shows Northeast to Southwest spread pattern
Current Knowledge

- LD Expanding
- Number of Human Cases Increasing
- No entomological information is available regarding the distribution and abundance of the vector – *I. scapularis*
Study Goal

Characterize the entomological risk of LD spread from VA into NC.
Strategy & Study Sites
Results
Tick Flagging

Abundance:
- Highest Collected North-Most Parks
- Absent Lake Norman State Park

Infection Rates:
- North-to-South Trend
- Lake Norman (Iredell County)
  No Information Available
Hunter-Harvested Deer

Abundance:
- Grouping of Counties
- Trend of North-to-South Decrease in Tick Burden
- Seems Consistent With Flagging Data
- Contrast With Flagging Data

Infection Rates:
- Similar (14-13%) Northern, Central Counties
- No Detection Southern Counties (N=5)
- County Level
  - Rockingham 22%
  - Yadkin 17%
  - Forsyth 13%
Preliminary Interpretations

- Implies North-to-South gradient in *I. scapularis* densities
- Suggest North-to-South distribution of *B. burgdorferi* infection
- Entomological Risk
Tick Surveillance in Northwestern North Carolina
• Rockingham County
  • 2 Ticks (5%) *Borrelia miyamotoi* (Tick-Relapsing Fever)
  • 8 Ticks (20%) *Anaplasma phagocytophilum* (Anaplasmosis)
  • 1 Tick (2%) Coinfection For
    • *B. burgdorferi*, *A. phagocytophilum*
  • 1 Tick (2%) Coinfection For
    • *B. miyamotoi*, *A. phagocytophilum*

• A. *phagocytophilum*
  • 1 Forsyth County (13%)
  • 2 Stokes County (4%)
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**Future Direction**
- Role of Topographic Corridors
- Anthropogenic Forested Fragmentation
- Local Vector-Host Interactions

**Wrap-up**
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Questions