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

<u>Associated Diseases:</u>

- Human monocytic ehrlichiosis (HME)
- Ehrlichiosis ewingii
- Southern tick associated rash illness (STARI)

A. maculatum AKA Gulf Coast tick

<u>Associated Diseases:</u>

- *Rickettsia parkeri* rickettsiosis

Dermacentor variabilis AKA American dog tick

<u>Associated Diseases:</u>

- Rocky Mountain spotted fever (RMSF)

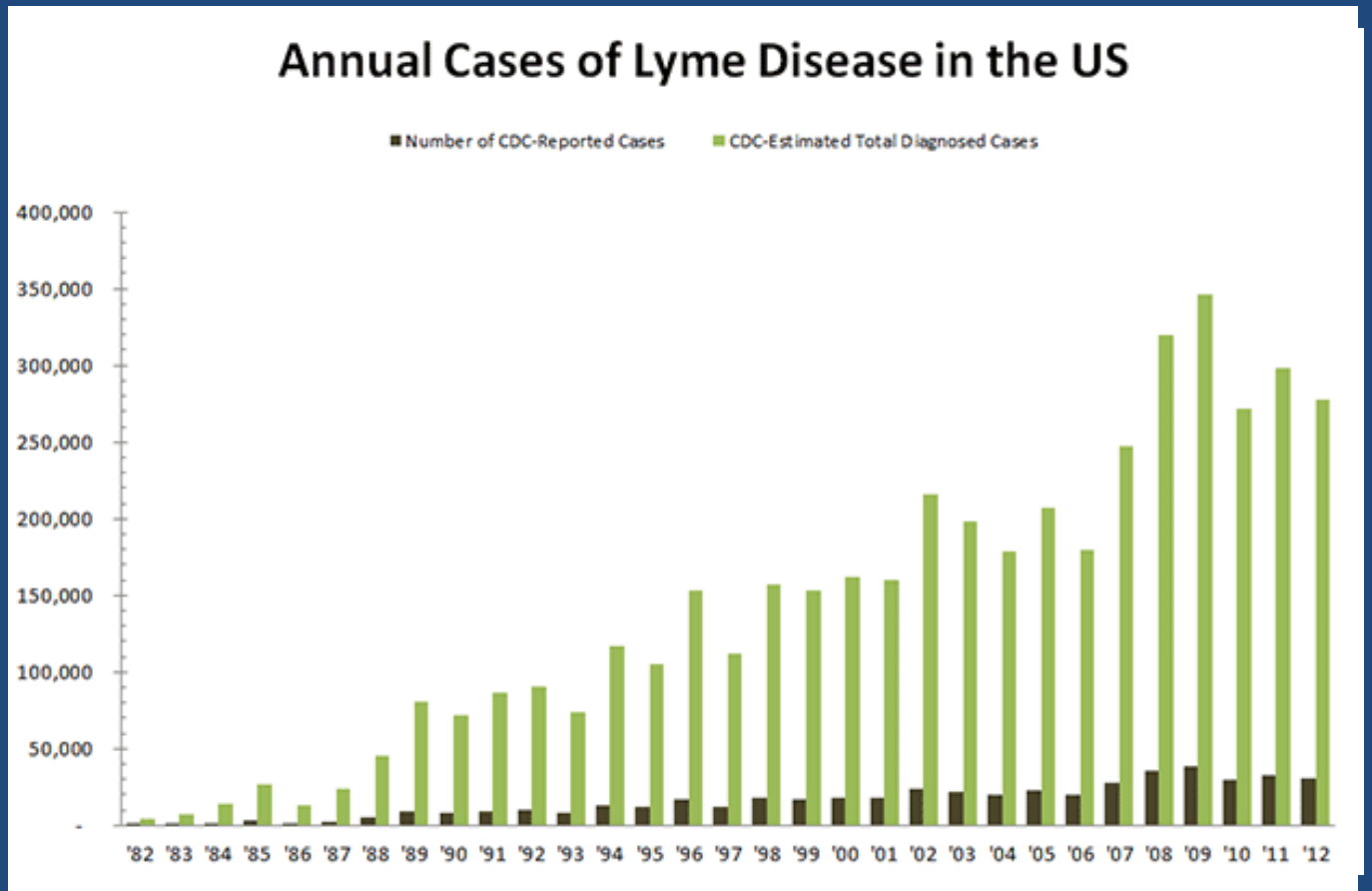
Ixodes spp.
- *I. scapularis*
- *I. minor*
- *I. affinis*

<u>Associated Diseases:</u>

- 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



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

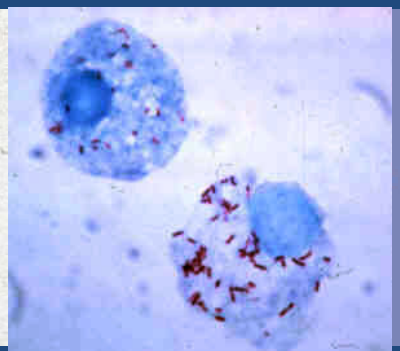
Objectives

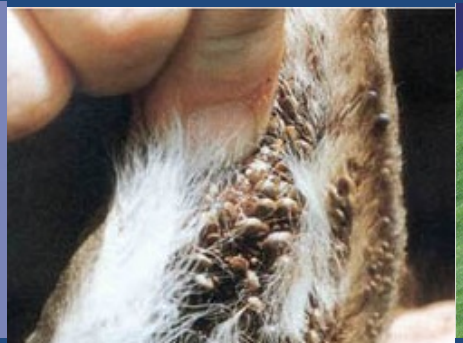
In southwest Georgia, determine:

1) Tick abundance & seasonality

2) Tick-borne pathogen prevalence

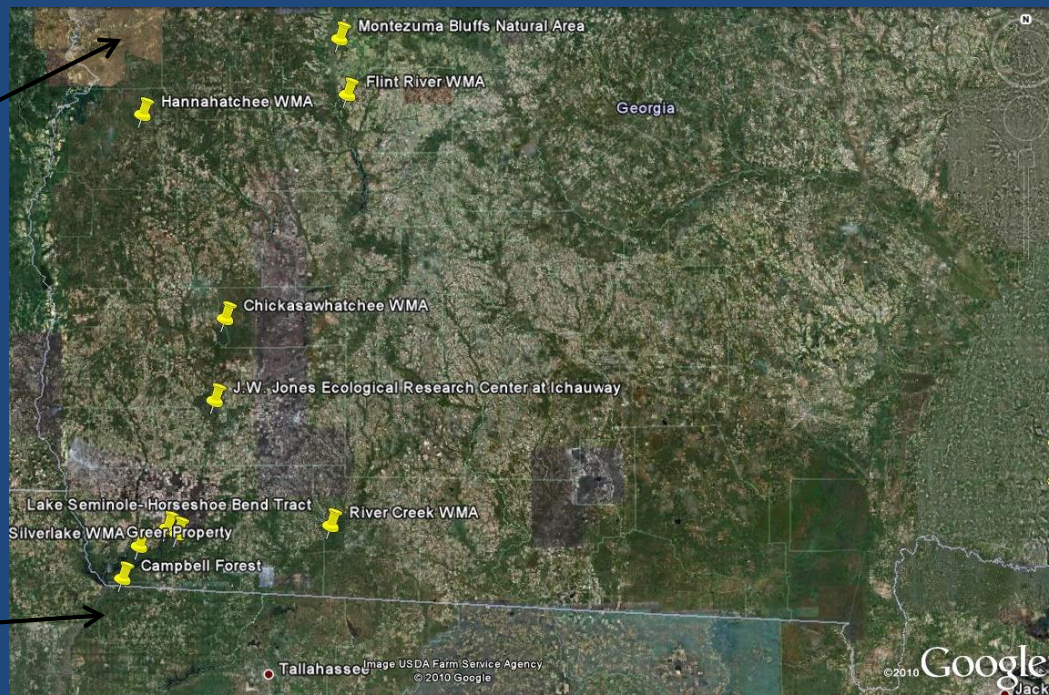
3)Determine the effects of long-term prescribed burning on the above



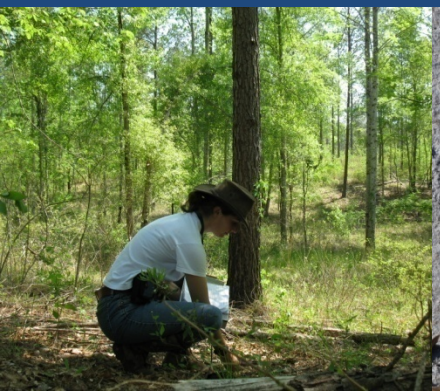

Study Design

- 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 → **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!!

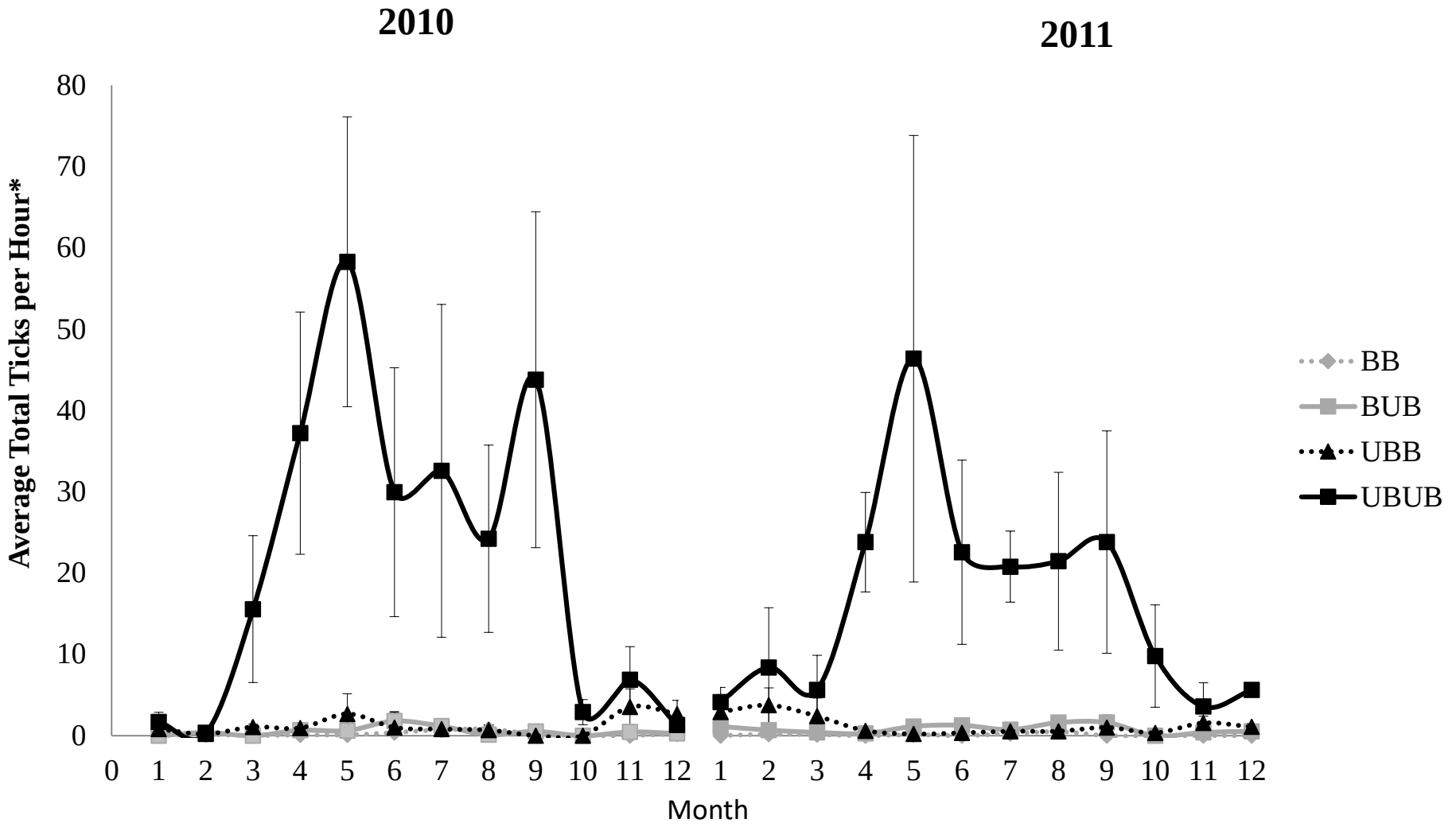
Lone star tick by far most abundant ←

Black-legged tick second most common ←

Gulf coast tick surprisingly abundant; third most common ←

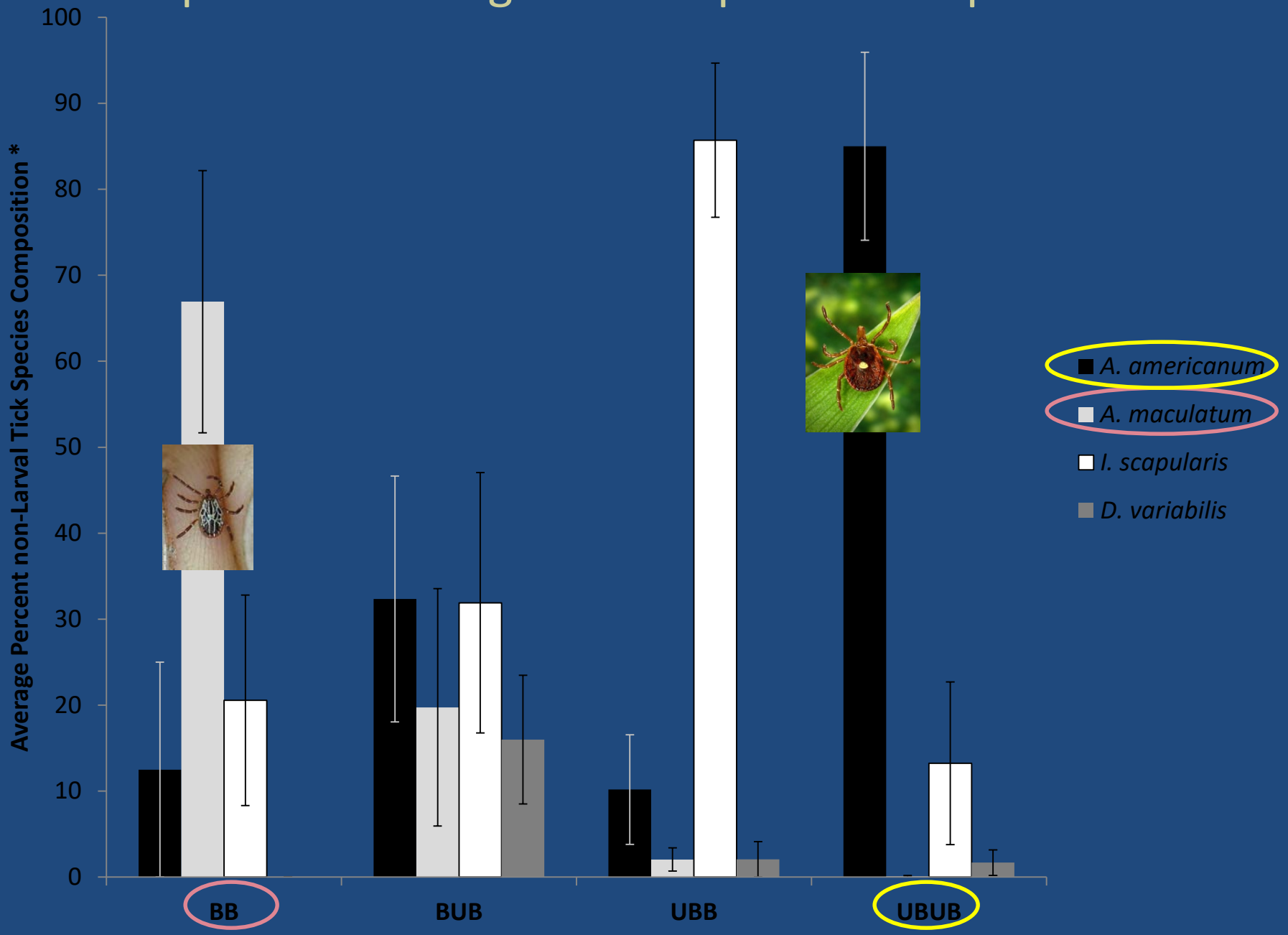
American dog tick fourth most common ←

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



Take-Home Message

- Long-term prescribed fire reduces tick populations
  - Regardless of:
    - Burn Interval
    - Host Abundance
    - Vegetation Structure

  →~98% reduction in ticks!!
- WHY?
  - Change in vegetation structure → 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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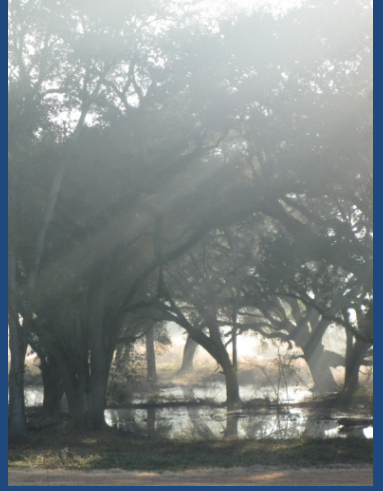

Questions?

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