This study investigates the relationship between longleaf pine (Pinus palustris Mill.) mast (i.e., cone crop) and tick-borne diseases, climate influences on mast size, and the effects of masting on radial-growth patterns that may influence climate reconstructions in the southeastern United States. Tree-ring science principally examines the variation in annual growth rings that are often attributed to exogenous factors, such as climate, forest disturbance, or landscape processes. Less addressed have been tree-ring studies that incorporate endogenous factors, such as annual mast events where fruiting species synchronously and episodically produce abundant seed crops that are consumed and dispersed by forest predators such as deer, mice, and birds. Disease ecologists have linked masting cycles of hardwoods to tick-borne diseases such as Lyme, yet no research has extensively studied the influence of southeastern U.S. pine mast on disease prevalence in a region where tick-borne disease occurrence is increasing. Longleaf pine is a long-lived, masting species that has been investigated for various conservation and restoration purposes, and their tree-ring data are useful for developing climate reconstructions. Here, multi-decadal records of climate data, longleaf pine mast, disease prevalence for Lyme, Spotted Fever Group Rickettsia, and Ehrlichiosis, coupled with tree-ring chronologies from mast recording sites will be statistically analyzed to determine if: 1) mast yield influences the accuracy of climate reconstructions; 2) relationships exist between mast yield and tick-borne diseases; and, 3) stand dynamics influence mast/radial growth relationships.

**OBJECTIVE 1: DENDROMASTECOLOGY**

To what extent does annual mast affect tree-ring widths and thus influence climate/growth relationships?

**OBJECTIVE 2: DISEASE CONNECTION**

Does a relationship exist between longleaf pine mast years and the frequency of tick-borne disease?

**OBJECTIVE 3: STAND DYNAMICS**

How do stand dynamics (i.e. thinning) alter masting/radial growth relationships?

USFS: Cone mast at 10 sites
Audubon: Bird population for 6 states
NOAA: Drought severity by climate division
CDC: Lyme, SFGR, Ehrlichiosis
SACC: Wild and Rx fire for 6 states

Consistent significant relationships
Annual mast x Northern Bobwhite Quail $r = 0.36$
Northern Bobwhite Quail x SFGR $r = -0.71$
Northern Bobwhite Quail x Ehrlichiosis $r = -0.68$

Not significant
Wild and/or Rx fire
Other bird spp. (RCW, nuthatches, Bachman Sparrow)
Climate variables (drought severity)

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Legend:
- BLSF
- JLSP
- SHSF

Consistent significant relationships
Annual mast x Northern Bobwhite Quail $r = 0.36$
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Other bird spp. (RCW, nuthatches, Bachman Sparrow)
Climate variables (drought severity)

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**Aggregate growth model:**

$$R_t = A_r + LD_{D1} + LD_{D2} + E_t$$

**Traditional climate Cone mast data**

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**Longleaf Pine Cone Production in Southern Region (since 1966)**

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**USFS:** Cone mast at 10 sites

**Audubon:** Bird population for 6 states

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