

Trends in Arthropod Biodiversity Systems (TABS) Project

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Longleaf pine ecosystems are among the most biologically diverse in North America, hosting groundcover plants exceeding 140 species per 1,000 m², 217 vertebrate species, and >3,000 arthropod species¹⁻³. Despite restoration efforts, the extent of this ecosystem has been drastically reduced to <5% of its original range⁴. Arthropods provide many ecosystem services within these habitats from decomposition, pest regulation, pollination to nutrient cycling, and their services may be impacted by such habitat changes. Around the world, scientists have reported loss of arthropod biomass and diversity, although others have reported no or modest declines in particular taxa⁵⁻¹². Results may be habitat-specific and especially relevant for species rich and rarer habitats. Hence, the need for long-term monitoring of arthropod populations and communities is clearly critical for the longleaf pine and other similarly endangered ecosystems.

At the Jones Center at Ichauway, we established an arthropod monitoring program in 2020 to assess changes in numbers, biomass, species diversity, and species composition over time - the Trends in Arthropod Biodiversity Systems (TABS) project. We identified and grouped four ecological communities that will give the best understanding of Ichauway's arthropod diversity and its changes over time: 1) agriculture; 2) flatwoods; 3) fluvial terrace; and 4) upland habitats¹³.

Embedded within the monitoring program are critical research questions that drives this work:

1. How do arthropod populations and communities differ between the four habitat-types?
2. How do arthropods respond to high frequency and low intensity prescribe burning which is typical of longleaf pine ecosystems?
3. How do arthropod populations and communities differ between sites dominated by wiregrass and other native groundcover species?
4. How does proximity to forest edges (natural and anthropogenic) affect arthropods?
5. How do the prevalence and abundance of arthropod assemblages change with time?

Out target taxa include: 1) deadwood colonizing beetles; 2) ground beetles; and 3) pollinating insects, as well as total arthropod biomass. Over time this will allow us to quantify and describe trends in insect populations and communities as affected by site variables. These groups are both sensitive to ecosystem disturbance and providers of essential ecosystem services¹⁴⁻¹⁵. We are collecting deadwood colonizing beetles using baited flight intercept traps, ground beetles with pitfall traps, and pollinating insects with blue vane traps and bee bowls (Fig. 1). Traps will operate for one week per month during June-August every year until at least 2030. We are determining the biomass in every trap sample and will identify target taxa to species-level. Data on site attributes e.g., habitat structure and composition, and soil physical and chemical composition are being collected for correlation with arthropod communities.

While this project was designed for the longleaf pine ecosystem of Ichauway, it applies well to other ecosystems. If you are interested in learning more about this project and how you might replicate our study design, please contact Tom Sheehan (tom.sheehan@jonesctr.org).



Figure 1. (From L to R) Pitfall trap with barrier, blue vane trap, baited flight intercept trap, bee bowls.

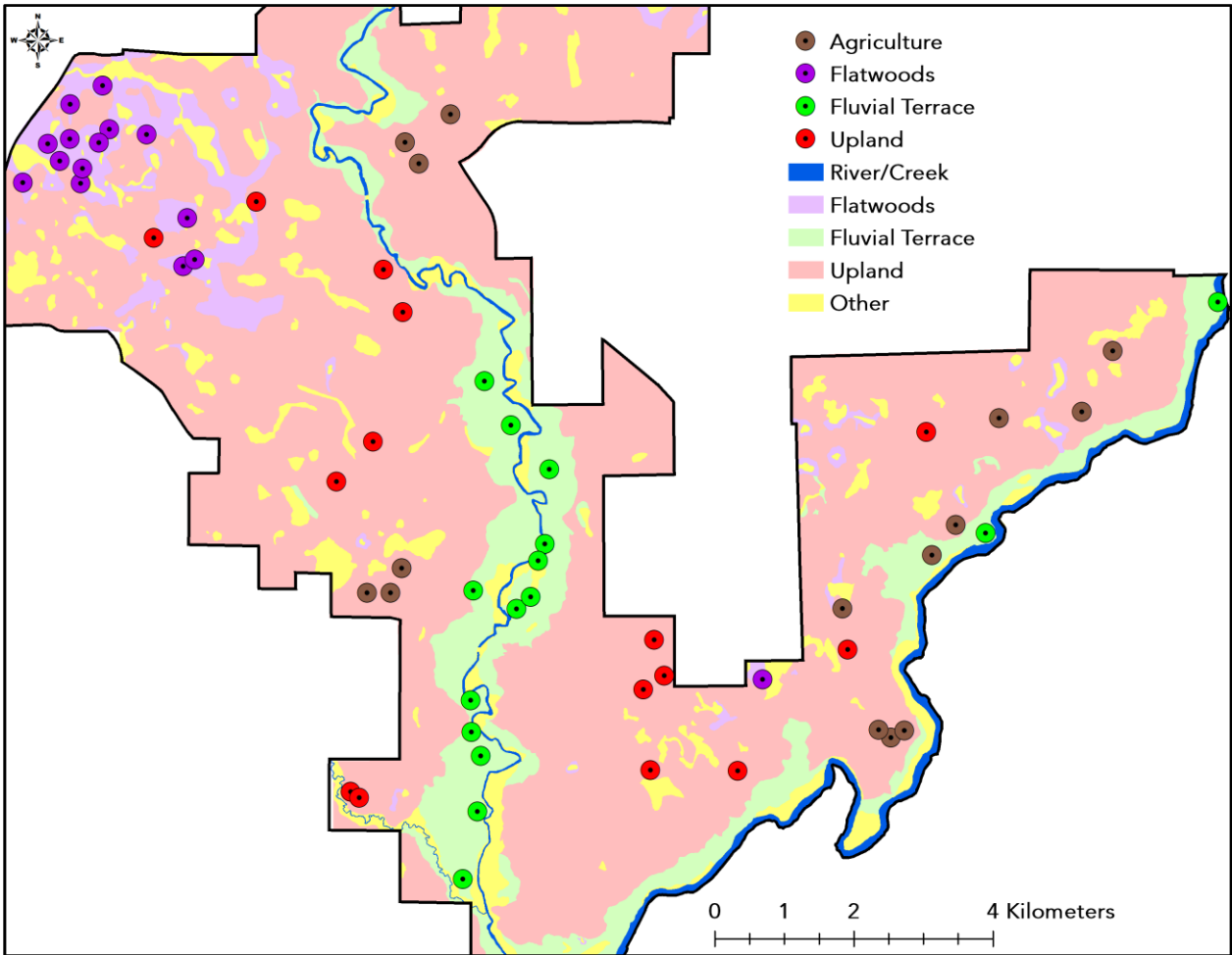


Figure 2. Sixty trapping locations across four ecological communities located on The Jones Center at Ichauway, Baker County, GA, USA

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