

The Effect of Habitat Structure on Bird Species Richness across Forest Types in Indiana

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Background:

Nearly 3 billion birds have been lost in North America since 1970. Habitat loss and changes to forests caused by human activities are major threats to bird populations. These changes can create forests that differ in age, vegetation, and structure. Birds are often studied using traditional surveys, where researchers count birds along set routes or at specific locations. These surveys can take a lot of time, cost more to conduct, and cover only a limited period. Passive acoustic monitoring (PAM) offers another way to study birds by using sensors to record their sounds over longer periods and in hard-to-reach areas. This study combines PAM with remote sensing to examine how bird species richness (the number of different bird species in an area) varies with forest structure across different forest types.

Methodology:

- Passive acoustic sensors were placed at 75 locations within four forest sites in west-central Indiana in May 2025.
- The sites represented four forest types: Mature Deciduous Forest (MDF), Forest Grassland Mosaic (FGM), Secondary Managed Forest (SMF), and Mixed Hardwood Forest (MHF).
- Recordings were analyzed using BirdNET to identify bird species and estimate bird species richness at each location.
- Satellite imagery and LiDAR data were used to measure vegetation and forest structure around each location.
- Statistical tests were used to analyze the data

Main Results

- Bird species richness differed among forest types. Mature Deciduous Forest had fewer bird species than the other three forest types.
- Forest structure was linked to bird species. More bird species were found in areas with greater vegetation cover 5–10 meters above the ground.

FOR FURTHER READING:

Pijanowski, B. C. (2024). Principles of soundscape ecology: discovering our sonic world. University of Chicago Press.

Rosenberg, K. V., Dokter, A. M., Blancher, P. J., Sauer, J. R., Smith, A. C., Smith, P. A., ... & Marra, P. P. (2019). Decline of the North American avifauna. *Science*, 366(6461), 120-124.

Sugai, L. S. M., Silva, T. S. F., Ribeiro Jr, J. W., & Llusia, D. (2019). Terrestrial passive acoustic monitoring: review and perspectives. *BioScience*, 69(1), 15-25.

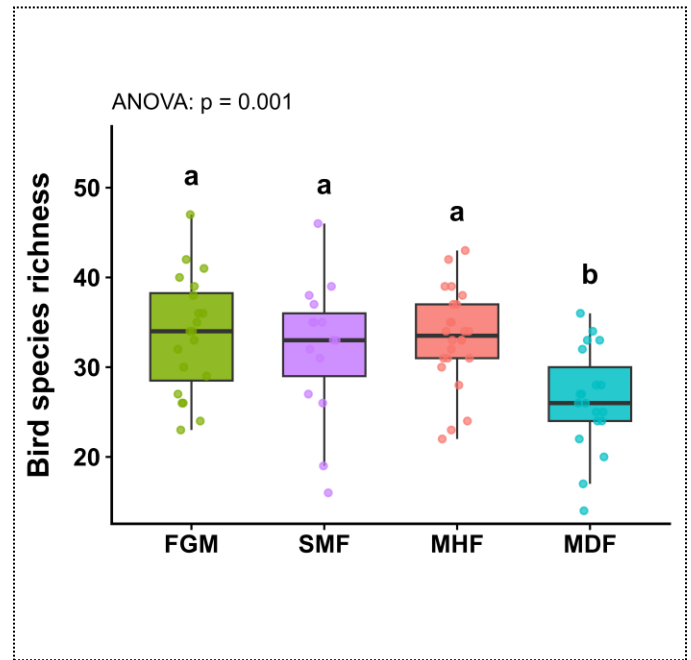


Figure 1. Bird species richness across forest types.

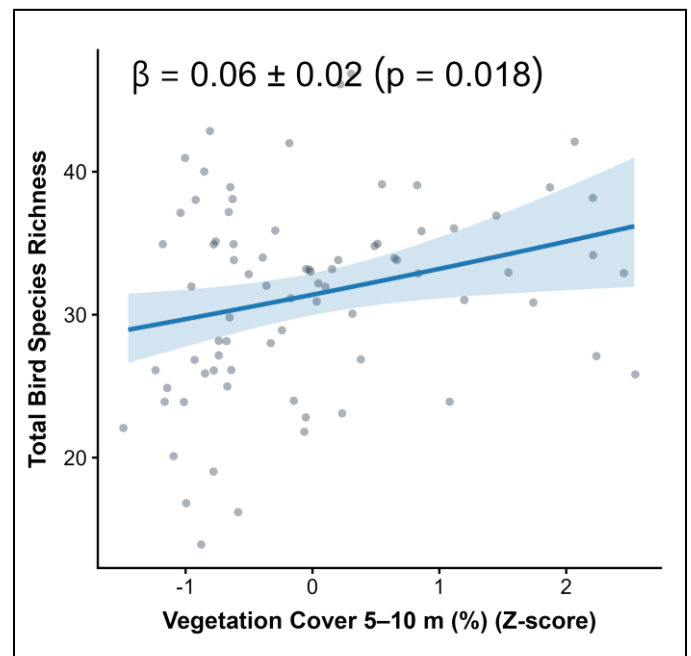


Figure 2. Relationship between vegetation cover at 5–10 m and bird species richness.