Spatial and Abiotic Effects of Urbanization on Small Mammal Communities

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Background

- We investigated how urbanization affects small mammal community structure and biodiversity.
- Urbanization: increasing human population density, artificial land use types, habitat fragmentation, and habitat degradation.
- Ecological theories may predict wildlife responses to urbanization, especially island biogeography theory or the intermediate disturbance hypothesis.
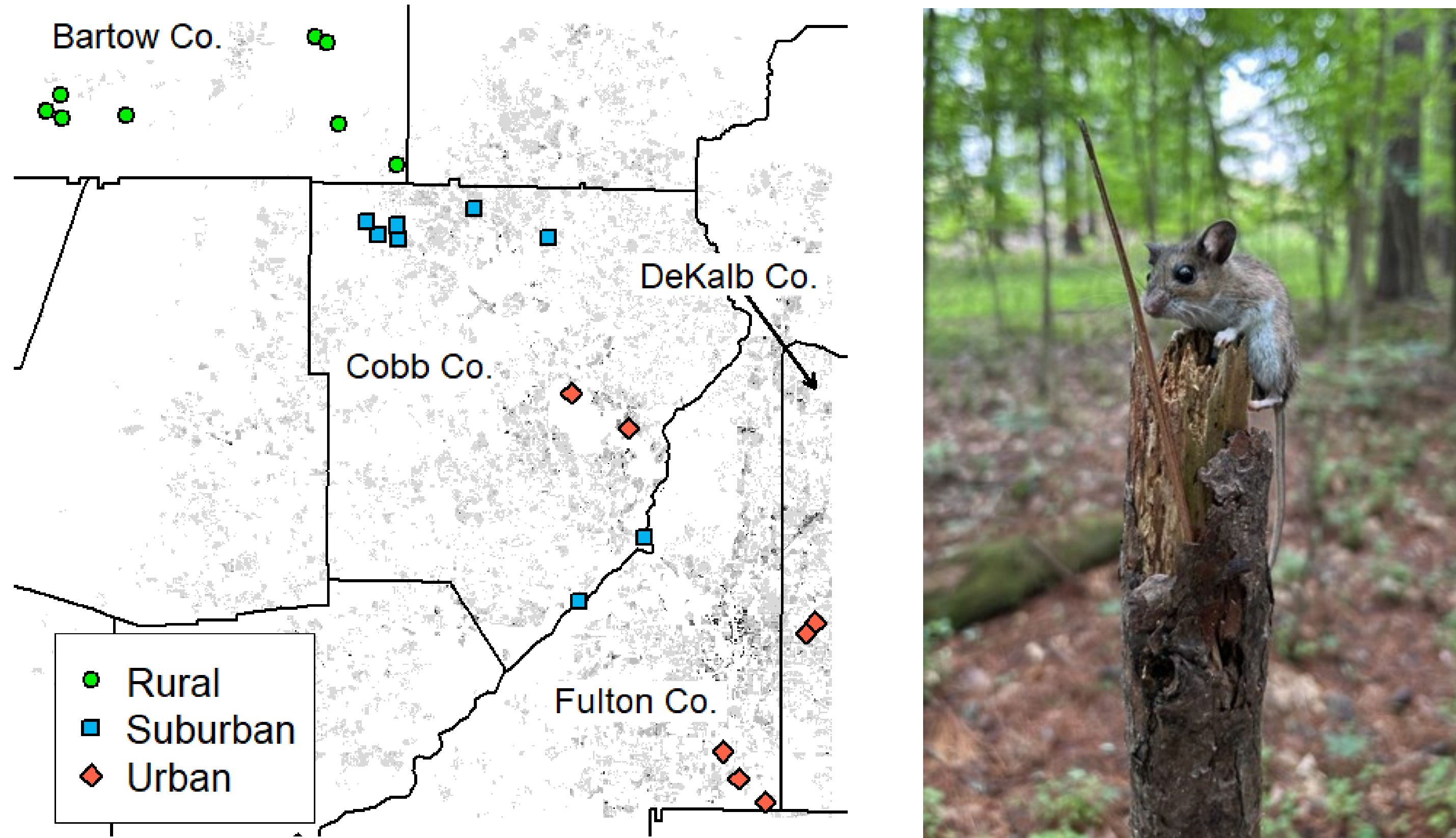
Methods

Figure 1. Left: Sampling sites along the urban-rural gradient extending from Fulton Co. (Atlanta) to Bartow Co., Georgia. Grey shading indicates human population density. Right: A white-footed mouse (*Peromyscus. leucopus*) in suburban Georgia.

- Trapped small mammals at 23 sites in rural, suburban, and urban settings.
- Related capture data to geospatial variables describing land cover, human population, and other factors in and around sites.
- Modeled small mammal biodiversity metrics using geospatial and environmental variables.

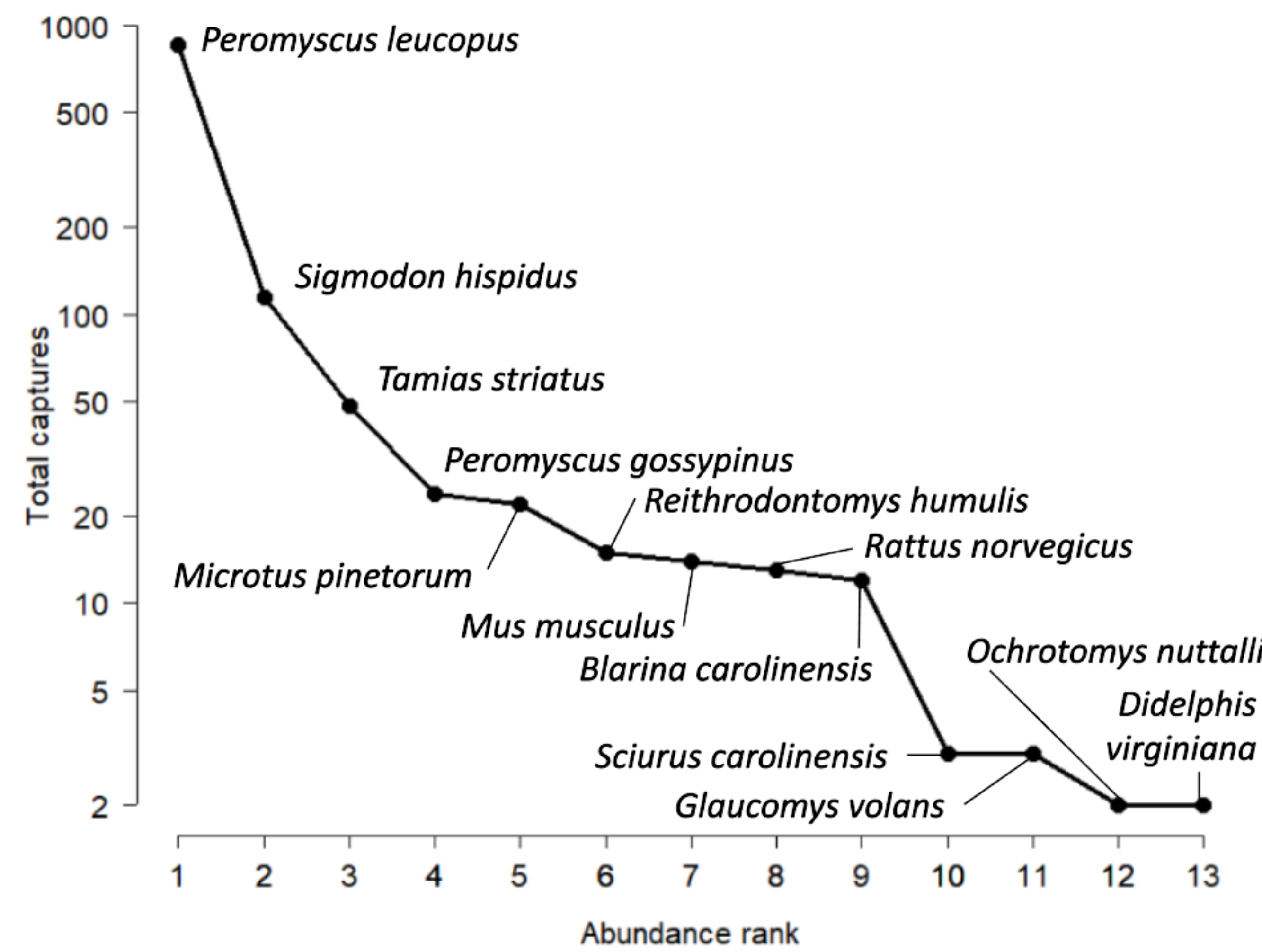## Preliminary Results

Observed Mammal Diversity

Figure 2. The rank abundance curve shows numerical dominance by white-footed mouse (*P. leucopus*).
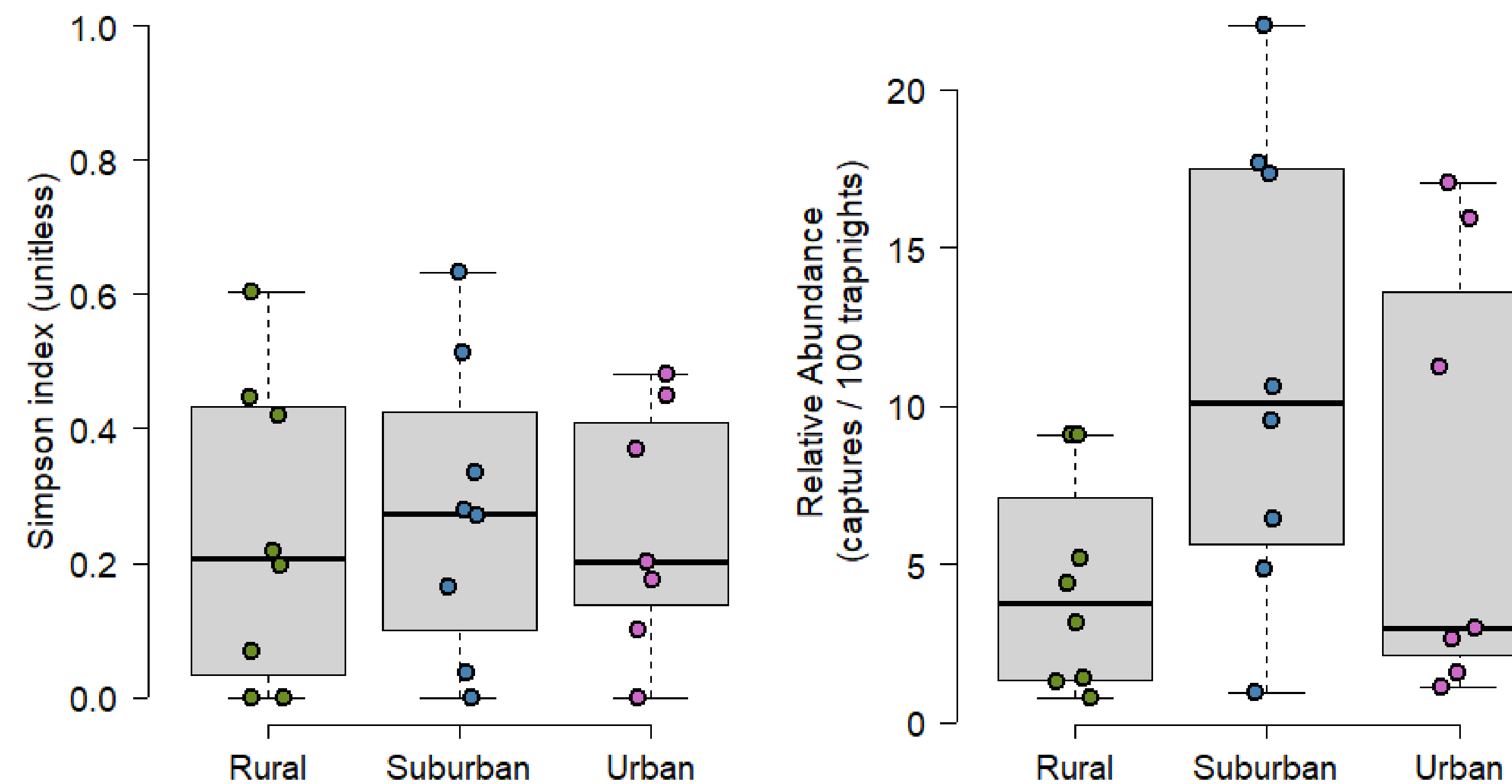
Community Structure

Figure 3. Neither Simpson index nor overall abundance differed significantly between treatments (Kruskal-Wallis tests, $P > 0.05$), although both metrics appeared greater in suburban sites than in other sites.

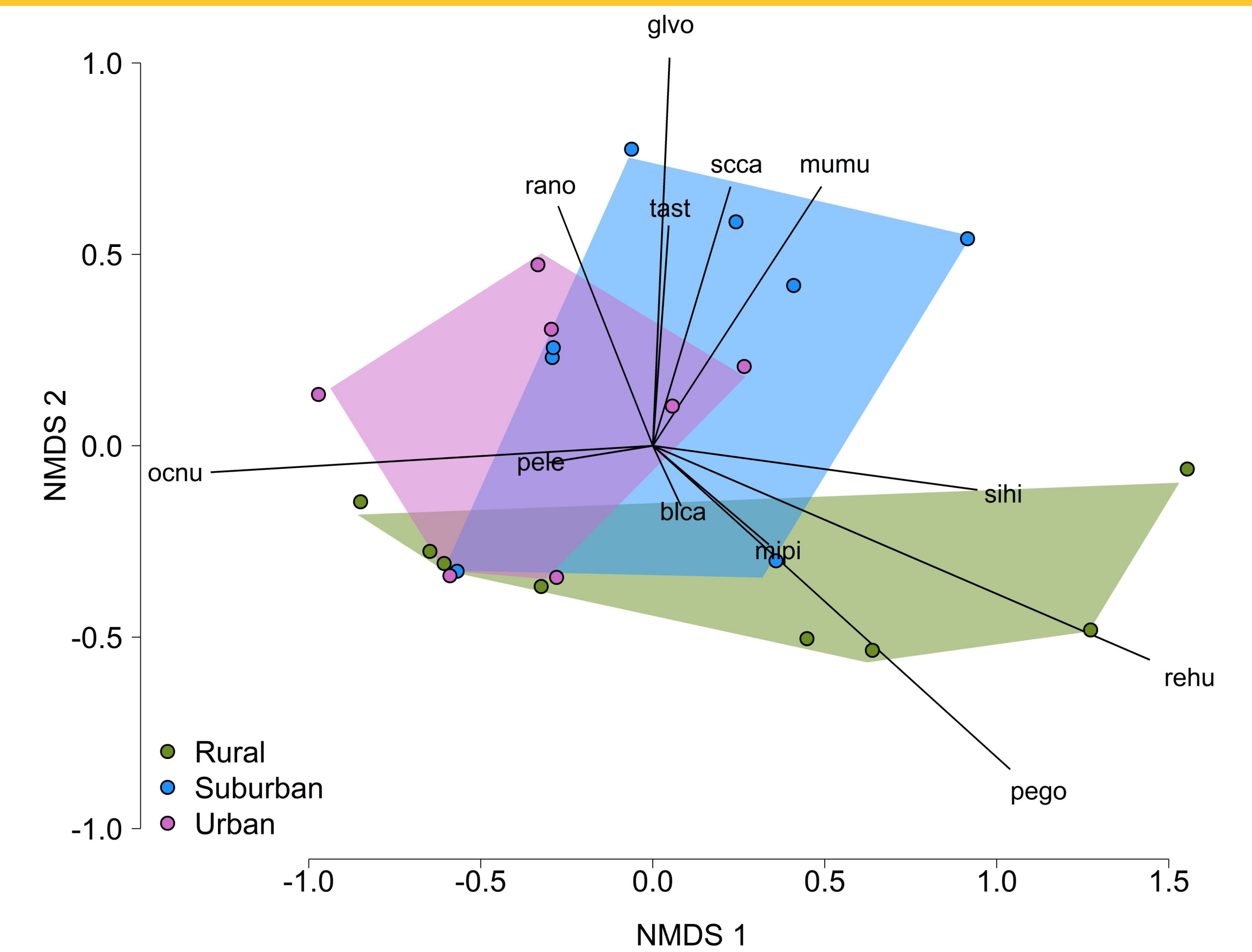### Urbanization Affected Diversity

Figure 4. Nonmetric multidimensional scaling (NMDS) ordination of mammal communities. Multiple response permutation procedures (MRPP) found a significant difference between treatments ($A = 0.08$, $P = 0.04$).

Preliminary Conclusions

- Small mammal communities dominated by white-footed mice (*P. leucopus*) regardless of urbanization or landscape characteristics.
- Relative abundance and Simpson index were greater in suburban sites, possibly supporting the intermediate disturbance hypothesis.
- Multivariate analysis suggests associations between species and site type.
  – *P. gossypinus* and *R. humulis* may indicate rural sites.
  – *M. musculus, T. striatus,* and *R. norvegicus* may indicate suburban and urban sites.