

Avian Communities in an Urbanizing Region: Abundance Patterns and Effects of Local Habitat Features

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Figure 1. Some of the South Texas specialty birds. Green Jay, White-tipped Dove, Long-billed Thrasher, and Olive Sparrow (clockwise from top left).

Project Need

Urbanization affects local biodiversity through habitat loss and biotic community changes associated with the subsequent structure of “replacement habitats” (Blair 1996, Chace et al. 2006, McKinney 2002). Global trends of urbanization (human population growth and shift, and increased urban area) are apparent in the Lower Rio Grande:

- 70% population increase since 1960s
- 46% increase in urban area 1993-2003 (Huang & Fipps 2006)

These changes have tremendous implications on biodiversity and ecological processes that support our subtropical environment.



Figure 2. Examples of older developments in Edinburg and McAllen (A & B), and newer developments (C & D). Most newer developments feature mainly exotic ornamentals.

Study Goals

- 1) Explore abundance patterns of avian communities in suburban and remnant urban woodlands, with a particular interest in native forest bird species.
- 2) Assess effects of local habitat variables on avian communities in residential habitats.
- 3) Provide recommendations to enhance conservation and ecosystem services associated with bird diversity.

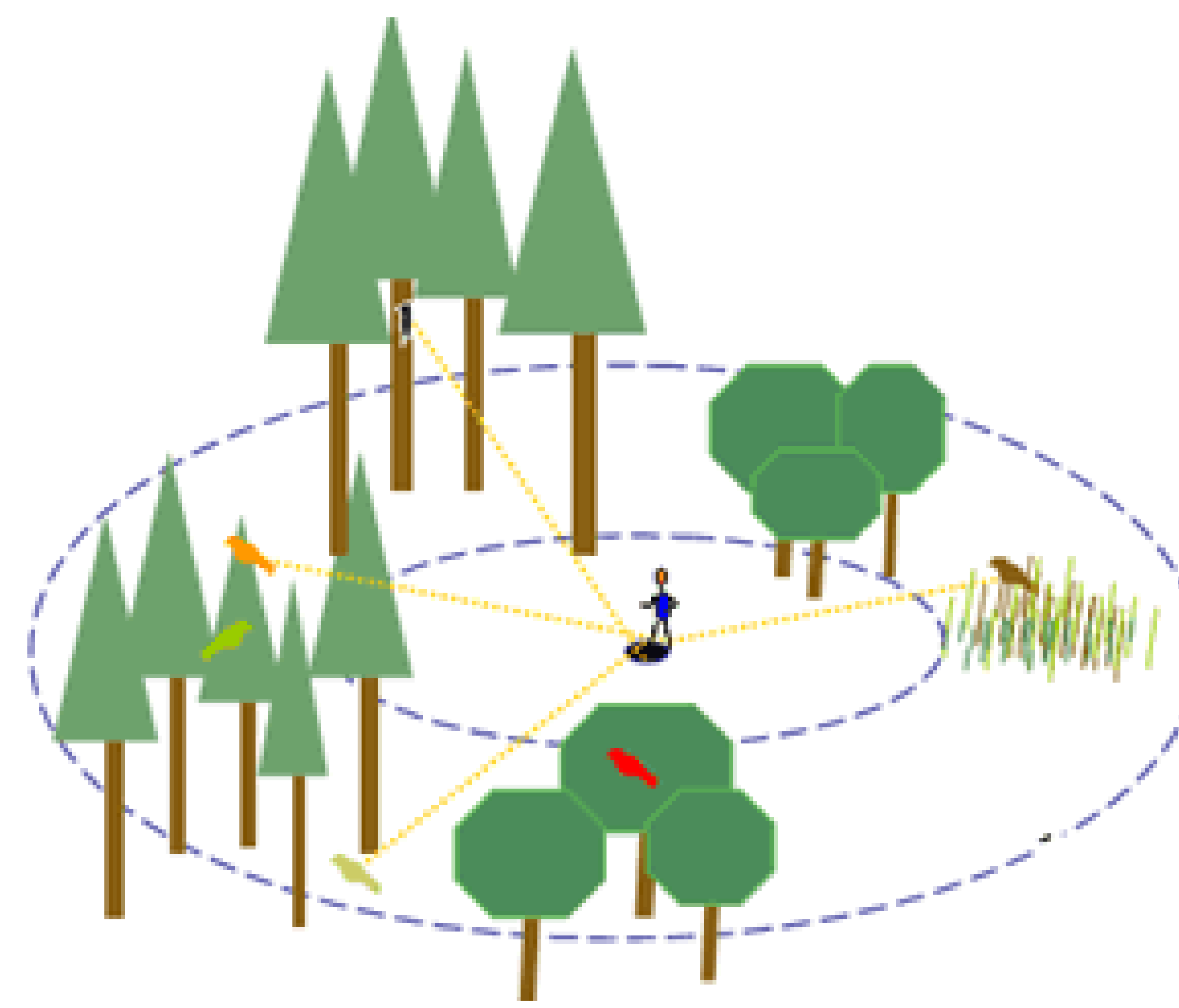


Figure 3. Visualization of point count methodology. Taken from USGS.

Point-Count Methodology

55 census plots were established in residential habitats of varying amounts of tree cover and in urban woodlands (such as the McAllen Nature Center). Three 10 minute point counts were conducted at each plot between April-July of 2015 and 2016, for a total of 330 surveys.

- Birds were counted by sight and sound
- Birds counted within 50 m were used for analysis (to allow for linking between occurrence and habitat)

Results from a previous study (Brush and Feria unpub. 2014) were used to select representative native forest birds (criteria: bird presence on 1/4th of surveys at Santa Ana NWR). Presence/absence was used to calculate retention in urban surveys.

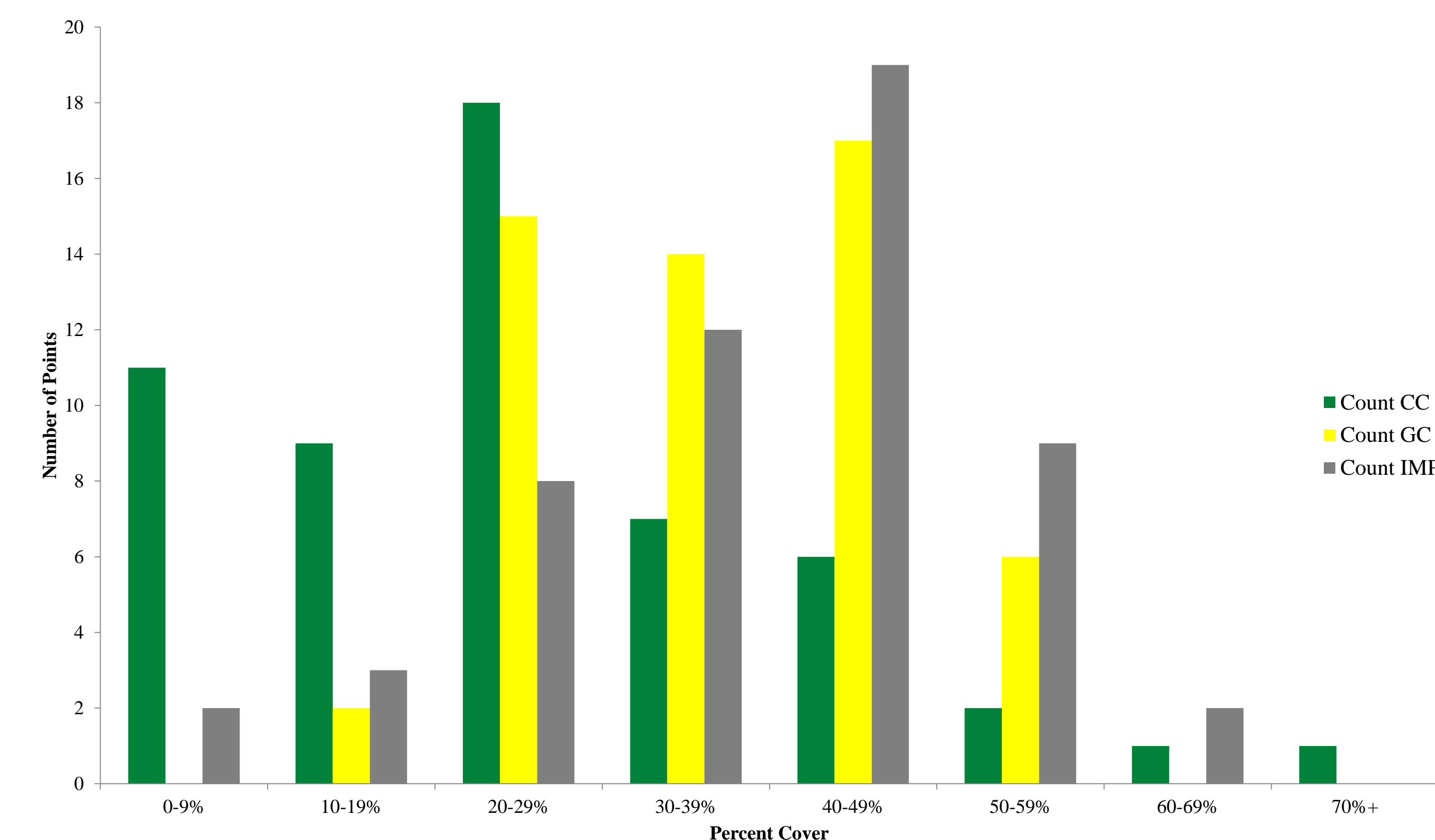


Figure 4. Distribution of points by percent canopy (CC) grass cover (GC), and impervious cover (IMP).

Local Habitat Features

Satellite imagery from 2014 was acquired from the National Agriculture Imagery Program (NAIP) via the Texas Natural Sources Information Service (TNRIS). Using Arcmap and Google Earth, we calculated:

- Percent canopy, grass, and impervious (buildings/concrete) cover within a 100 m radius around each census point.

Vegetation surveys were also conducted on-site, and included counts of trees within a 0.08 ha circle centered on each residential survey point.

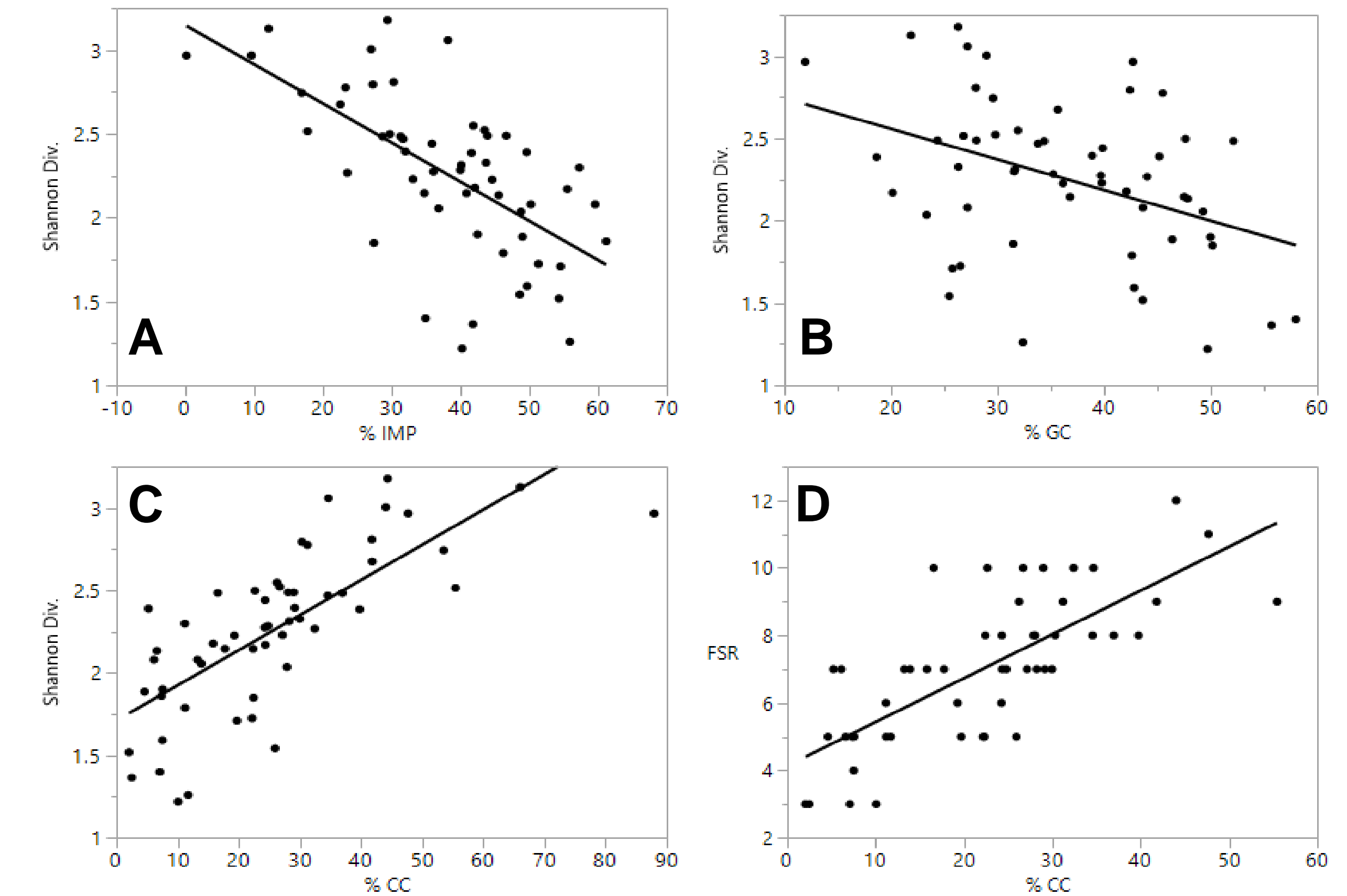


Figure 5. Linear regressions of Shannon diversity with percent cover of (A) impervious, (B) grass, and (C) canopy. (D) Forest species richness regressed against percent canopy cover. All were significant ($p < 0.05$).

Results Quick Hits

- 39 bird species observed ≥ 1 time, ranging from ubiquitous to scarce
- 18/19 native forest bird species detected, with 3 only seen on urban woodland surveys (Olive Sparrow, White-tipped Dove, & Long-billed Thrasher)
- Granivorous birds 5.1 times more abundant than insectivores, omnivores 3 times more abundant than insectivores
- 83% of all trees non-native, yet there was a significant positive correlation ($p < 0.05$) with bird diversity metrics and number of native trees
- No diversity metric associated with Live Oak (*Quercus virginiana*)
- Cavity-nester abundance had a positive significant correlation with number of ash trees (*Fraxinus* spp.)

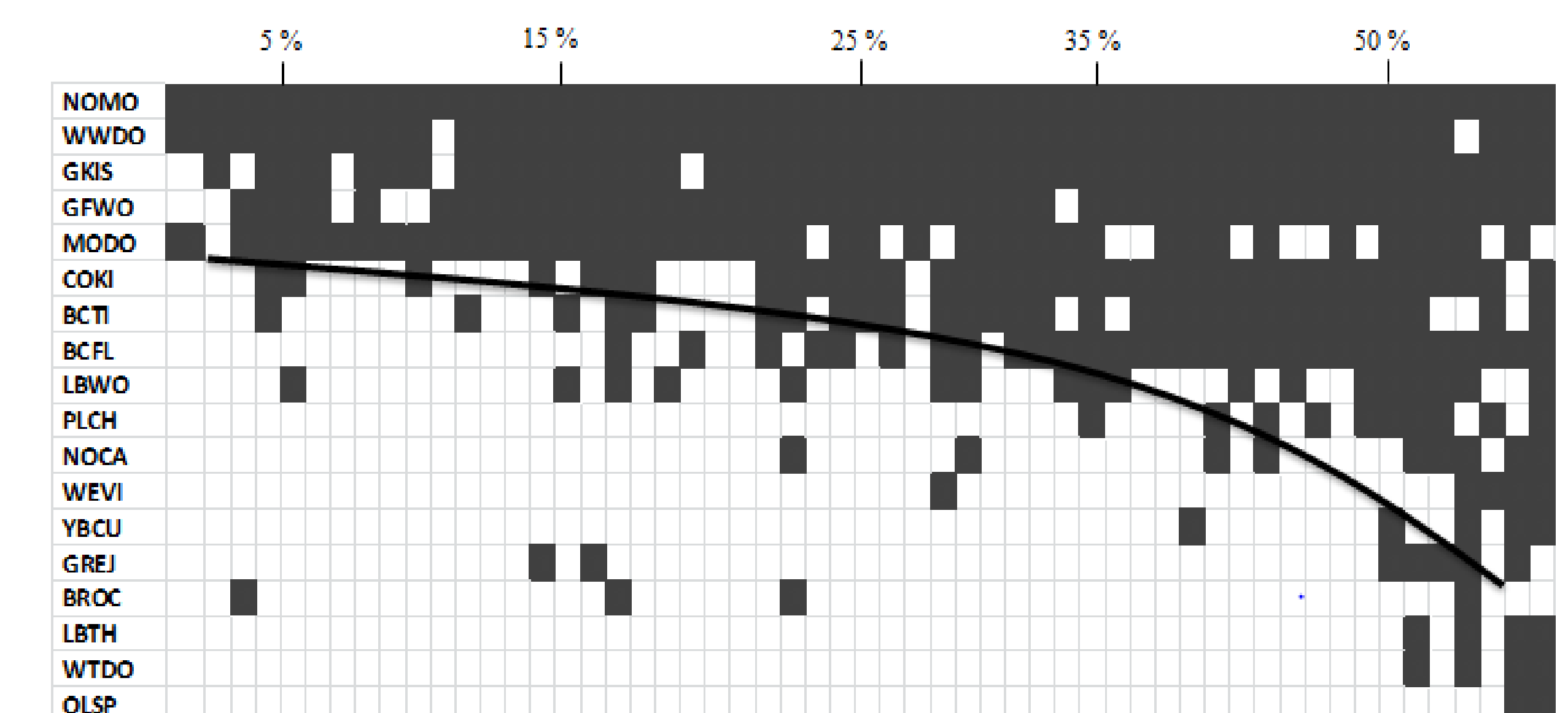


Figure 5. Ten forest bird species occurrence thresholds determined by logistic regression (present on <90% & >10% of survey points) with percent canopy cover.

Discussion

- Local habitat features, such as land cover, have significant effects on bird diversity and communities
- The majority of species encountered qualify as urban exploiters and urban adapters of varying degrees
- Several regionally common species were urban avoiders that were only present in dense urban woodlands
- The abundance of omnivores and granivores in line with results from temperate environments
- Increasing canopy cover is a viable method to enhance native bird diversity in residential neighborhoods