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Final Proposal

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Impacts of Habitat Attributes on Urban Bird Communities

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Introduction to Scientific Computing

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1. Abstract

The Rio Grande Valley of Southern Texas is a major agriculture region yet has some of the highest hunger rates in the USA. Urbanization and agriculture affect biodiversity, which is well studied, but little is known about how agriculture affects biodiversity in urban areas. Factors investigated here include how different urban attributes, including those related to urban farming , impact bird communities in Brownsville and Harlingen, TX, and compared sites that have community gardens to those that do not. Other factors included three key urban habitat characteristics, sites that encompassed these characteristics were identified and bird communities were surveyed for three separate days in a season in 2017. In order to determine what factors affect bird communities an ANCOVA model will be constructed that includes urban habitat characteristics, as well as a post-hoc pairwise test to compare community gardens to other sites.

2. Background

As the population increases in the RGV, the rate of urbanization and percentage of people living in urban areas is increasing, which is a trend seen globally (United Nations 2015). Urbanization in tropical or even subtropical regions like the RGV, where most of the worlds biodiversity is found, is of great concern (Chamberlain et. al. 2016), but has been inadequately studied. Human population increase within urban regions has shown a negative effect on breeding bird diversity(Gagne et.al.2016). urbanization contributes significantly to habitat loss and fragmentation, which drive the global decline in biodiversity, but urbanization also creates new niches that some wildlife can adapt to and fill. For example, bird species have shown to have varied success along urban-rural gradients (Miller and Adams 1995). Previous studies on this have led bird species and other wildlife being categorized as "urban avoiders", "urban adaptors", and "urban exploiters"(Blair 1999). This shows that even in highly modified environments, communities are assembled to contain species with specific adaptations that are influenced by different factors around their environment.

3. Relevance

Previous research on urban bird assemblages shows that communities are influenced by land cover within cities, such as habitat type, tree cover, and impervious cover (paved surface) (Evans et. Al 2009, Brush 2016). Furthermore, local factors are often as important as regional ones (Evans et.al.2009). many studies acknowledge that green spaces within urban and suburban landscapes can act as refuge that can provide shelter or supplement food (Robb et. al. 2008), but may be dependent on size, building or impervious cover, traffic and noise (Zuria 2011). Altogether because of its agriculture history rapid urbanization, high biodiversity, and recent development in urban agriculture, the RGV is an ideal location for studies on how urban agroecosystems (e.g., community gardens) impact biodiversity, and birds provide an ideal study system.

4. Objective

Bird community surveys and land cover (pavement, mowed grass, water, buildings, and woody cover) assessments conducted in Brownsville and Harlingen to compare diversity, abundance, and richness of birds between garden and non-garden sites as well as traffic and urbanity. This will provide insight on urban bird communities and their relation to habitat characteristics.

5. Planned Analysis

ANCOVAs will be plotted for species richness, abundance, and diversity. Figure 1 is an example of an ANCOVA comparing urban bird species richness by water presence (labels that share a letter are not statistically different). ANCOVA analysis will be done on all factors, NMS (Nonmetric mutlidimensional scailing methods will be done to quantify and illustrate differences in communities among habitats and habitat categories. Tofurthere examine results the data will be fitted using an environmental fitting function (envfit) from the "vegan"package in R. To test statistical significance between community composition and habitat attributes PerMANCOVA (permutational multiple analysis of covarience) will be conducted.

6. Broder Impacts

To address the increase of human population and food demand, increased percentage of people in urban areas, and the global loss in biodiversity Perfecto and Vandermeer (2007) suggest that small-scale agriculture is needed to conserve biodiversity and increase the quality of the agroecological matrix. This means fewer large-scale farms, more food being produced closer to where it is sold, and greater conservation of biodiversity by increasing the number and size of suitable habitat patches and decreasing the distance between patches. One such practice that can aid in this issue is urban agriculture. It is a growing trend globally and has the potential to combat hunger and food insecurity locally (more fresh foodfor people nearby), and conserve biodiversity in cities(increasing green space and habitat complexity), and conserve biodiversity outside of cities(less land farmed) (Mok et. al. 2014). In the RGV of deep South Texas, one in four people are considered "food insecure" (Foodbank RGV). The USDA defines "food insecurity" as the lack

of access, at times, to enough food for all household members. What is interesting is that Texas ranks third in the nation in annual agricultural cash receipts, behind only California (36.2 billion) and Iowa (24.75 billion) (Santa Ana 2011). Individually Hidalgo and Cameron counties are ranked as 7th and 24th out of 254 counties in leading annual agriculture cash receipts (Santa Ana 2011).

7. Timeline

-11/18/19: Continue plotting ANCOVAS

-11/24/19 :Finish plotting and analyse results from ANCOVAS

-11/26/19: Start plotting NMS before thanksgiving break (Nonmetric multidimensional saling)

-12/01/19: Piece it all together and write up discussion and results from all tables and figures.

-12/03/19: Finish final presentation

-12/08/19: Finish final paper

8. Refrences

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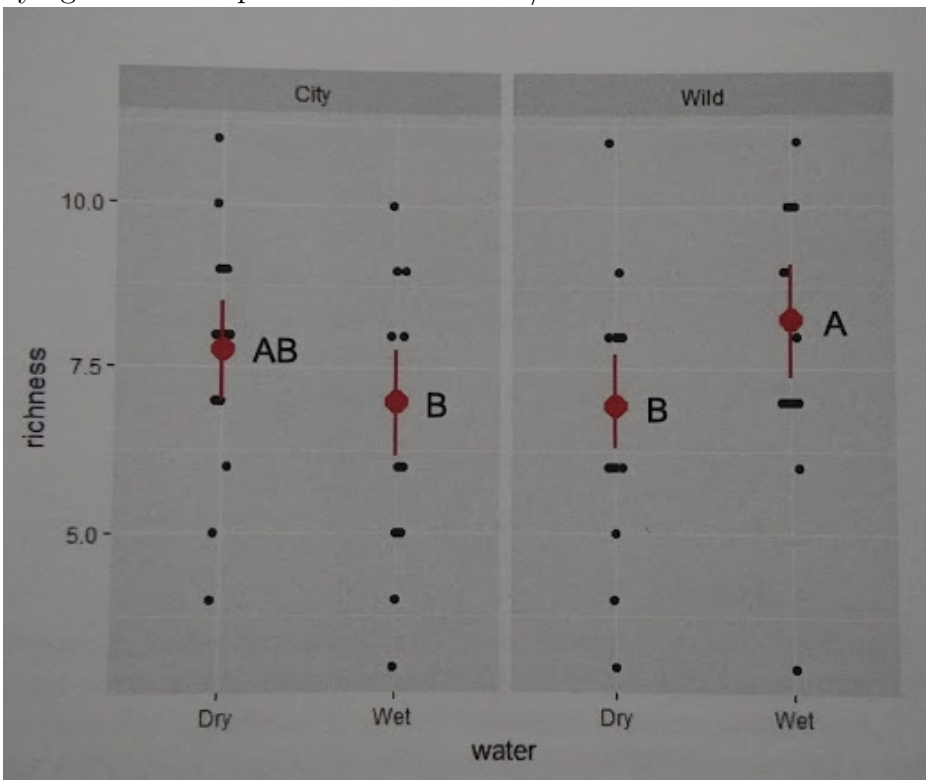

9. Figure 1