Avian Community Dynamics within A Riparian Corridor: A 12 Year Perspective

Alejandra S. Martinez

Drs. Jessica L. Glasscock, Reubar Antoniazzi,

Arthur Temple College of Forestry and Agriculture

STEPHEN F. AUSTIN STATE UNIVERSITY

Introduction

Accelerating declines in avifauna populations are causing rising concern of vital ecosystem processes and services being disrupted. North American avifauna have experienced a decline of nearly 3 billion breeding birds since 1970 with various factors contributing to the decline including habitat loss, fragmentation, and climatic change. Various long-term monitoring groups collect data on avian populations, including population size, trends, breeding status, and post-fledging productivity. These data allow for annual populations and shifts to be monitored for a variety of avifauna families. Recent literature has signified the decline in not only rare and threatened species, but also common North America species. Identification of shifts occurring in a small-scale avian breeding community can provide insight to characteristics contributing to shifts or trends taking place (i.e., reproductive status, site fidelity, etc). This research will examine a twelve-year temporal comparison within an avian community in a riparian woodland located on the Welder Wildlife Foundation Refuge, and determine if any population trends or shifts are occurring within the study area. Time of detectability for an avian community will also be studied utilizing autonomous recording units and the Monitoring Avian Productivity and Survivorship (MAPS) protocol. Specifically, this research has three objectives. **Obj. 1**: Determine occupancy and population trends of an avian community located within a riparian woodland utilizing the MAPS protocol, **Obj. 2**: Collect data on variables including age, sex, breeding status, and site fidelity, **Obj. 3**: Compare time of detectability of an avian community between two different methodology frameworks.

Methods

This study will be conducted during the summers of 2021, 2022, and 2023 on the Rob and Bessie Welder Wildlife Foundation Refuge, specifically in the Hackberry Motte study area. Previous data from the same site will be utilized for temporal comparisons (2007, 2008, 2009). Hackberry Motte is located along the Aransas River and is characterized with diverse vegetation including hackberry (*Celtis occidentalis*), anacua (*Ehretia anacua*), lime prickly ash (*Zanthoxylum fagara*), and inland sea oats (*Chasmanthium latifolium*). Following the Institute for Bird Populations MAPS protocol, ten, 12-meter by 2.6 meter, 33-mm tethered black nylon four tier mist nets will be placed opportunistically throughout the core area (1.11 hectare) of the study area. Upon capture, birds will be safely removed from nets and processed at the headquarters station. Primary data will be collected including status, date, capture time, net number, and station. Species, age, and sex will also be recorded when possible. Supplemental data will also be collected including skull pneumatization, breeding conditions, and molt limits. Productivity indices including fat, cloacal protuberance, and brood patch will be observed and recorded. These data will allow us to determine if any trends or shifts in the breeding bird community are correlated to reproductive and body condition characteristics.

Within Hackberry motte, four Wildlife Acoustic Song Meter 4s (SM4s) will be utilized to conduct bioacoustic surveys alongside the MAPS station. ARUs will be placed 76-meters apart from each other and 50-meters inland from the Aransas river. ARUs will be pre-programmed to record everyday beginning on the 18th of May and stop recording on the 8th of August. Settings will be pre-set to record 30 minutes after sunrise for 10 minutes and then again one hour after sunset for 10 minutes. These settings will allow for the ARUs to pick up passerine and like-passerines in the morning and in the evenings, as well as nightjars who call in the evening. Recordings will be analyzed utilizing the Wildlife Acoustic Kaleidoscope Pro Software, which is a spectrogram and metadata viewer that allows for one to view and listen to ARU recordings. Upon processing files, a personal library will be created to utilize as a detection algorithm for all avian calls on the recordings.

Results

Utilizing the MAPS protocol, we compared the community dynamics of birds from the summer of 2007, 2008, 2009, and 2021. Specifically, we compared the species diversity, i.e., the effective number of species, the rank abundance curves, and the species composition among years. We found similar species diversity over years (Figure 1). From the rank abundance curves (Figure 2) we observed consistency over years of the most abundant species, Northern Cardinal (*Cardinalis cardinalis*), however they exhibited a decrease in abundance each sample year. We also observed shifts in the second and third most abundant species in all sampled periods. Despite the similar species diversity and the relative consistency of the most abundant species, we found that the species composition of the community changed over the years (Figure 3). We emphasize that the changes of bird communities over years, with special concern with the declining of avian populations, can be the result of changes in habitat and/or environment conditions locally or regionally.

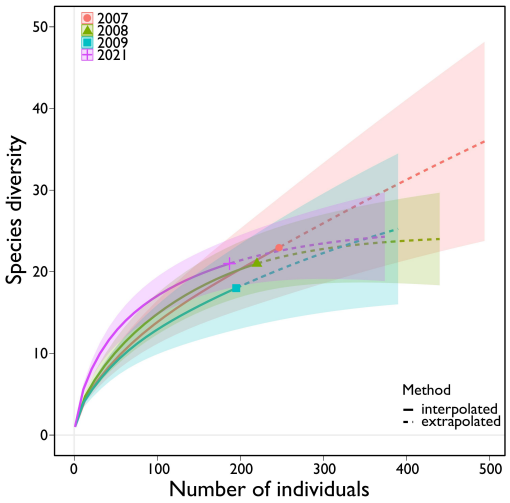

Figure 1. Species diversity curve.

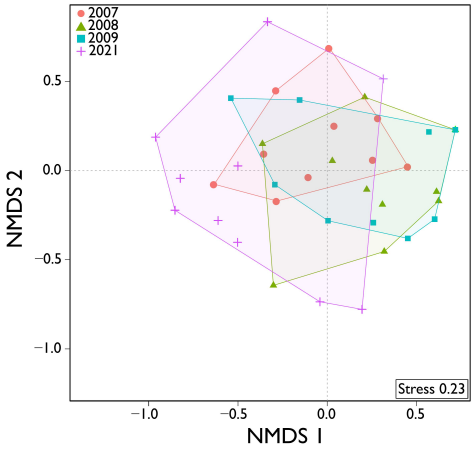

Figure 2. Rank abundance curve with three most abundant species each year.

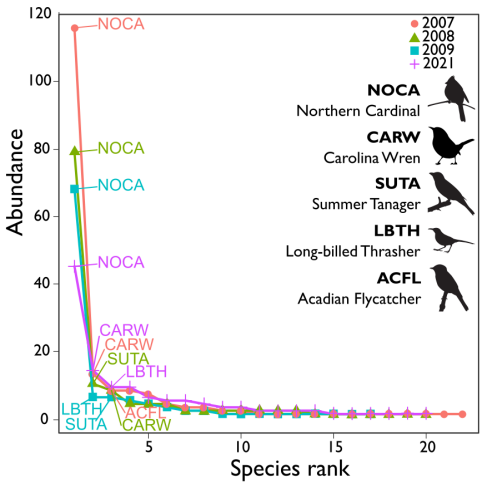

Figure 2. Nonmetric multidimensional scaling (NMDS) representation of species composition.

Alejandra S. Martinez is pursuing a Master of Science in Forestry at Stephen F. Austin State University. She received her Bachelor of Science in Forestry with an emphasis in Wildlife Management and a double minor in Geospatial Science and Environmental Science from Stephen F. Austin State University in 2021.