Characterizing Bird Communities in Areas of Mesquite Encroachment and Removal

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INTRODUCTION

- **Grassland birds** are declining faster than any other bird guild in North America[1].
- **Woody encroachment** degrades grassland bird **habitat** by creating vertical obstruction and outcompeting grasses
- **Mesquite** is a main driver of encroachment in the Sonoran and Chihuahuan deserts
- **Mesquite removal** can mitigate encroachment[2] allowing grass cover to increase, but bird responses to these treatments are poorly understood

Purpose: *Characterize breeding and wintering bird community relationship with encroachment, and determine community response to woody removal in Southern Arizona*

BIRD SURVEYS

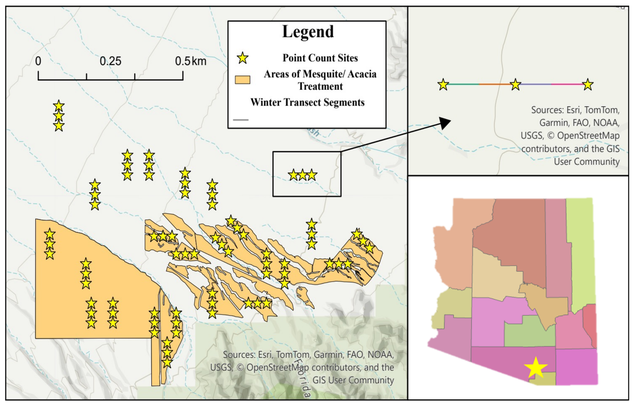
Study Area: University of Arizona's **Santa Rita Experimental Range (SRER)**[3] which has experienced extensive velvet mesquite encroachment

Treatment: 1200 hectares of **mesquite thinning** through mechanical grubbing and herbicide to reduce overall mesquite cover to 14%.

Research Approach: Breeding distance-based **point counts** and **winter transects** conducted before and after treatment to evaluate bird response

Bird Surveys:

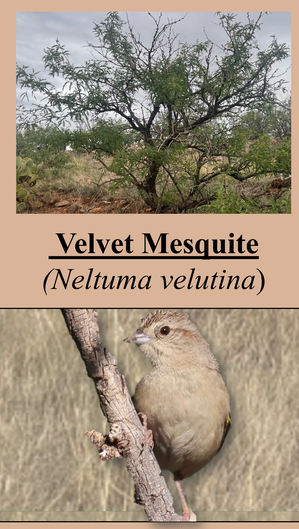
- **25 transects** across SRER
  - 18 transects to be **treated**, 7 transects **untreated**
- **Breeding point counts**
  - 3 points per transect (75 points)
  - **Spring** (Apr 15 to May 31), **Monsoon** (Jul 15-Aug 31)
- **Winter Transects**
  - 4 segments per transect (100 segments) from Dec 1 to Feb 15
- **Pre-treatment surveys:** August 2025 - August 2026
- **Post-treatment surveys planned:** December 2026 - August 2027







Velvet Mesquite
(Neltuma velutina)



1904



2018



Encroachment over time in the Santa Rita Experimental Range

ANALYSIS

Species Richness – Document seasonal variation in richness and timing of obligate grassland and other species[4] pre-treatment

Community Structure – Use non-metric multidimensional scaling (*vegan* Package in R)[5,6] to characterize seasonal community structure*

- Incorporate **remotely-sensed habitat covariates** (USGS RCMAP) at 125-m scale and observed **herbaceous** and **mesquite cover** at 25-m scale
- Plot **significant vectors** (<0.05) in 2-dimensional solutions
- Obtain **vegetation cover** pre and post treatment (Planned)
- Visualize **species** and **community habitat associations** pre and post treatment and test using **PERMANOVA** (Planned)

*Excludes raptors and corvids

RESULTS

69 species detected in year 1, but richness and composition varied across seasons

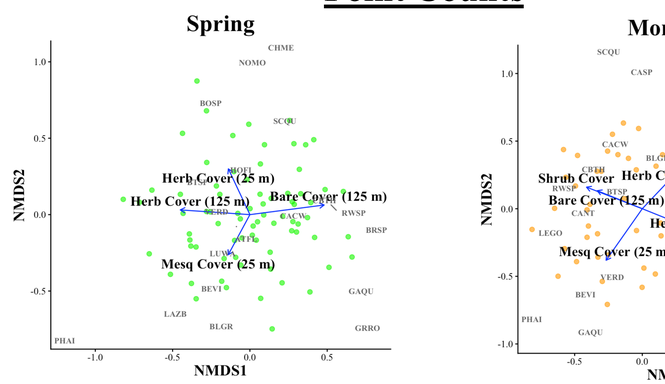
- Most Lucy's Warblers detection occurred in spring while Cassin's Sparrows only occurred in the monsoon season

Abundance of many **grassland obligates** is related to **increased herbaceous cover**

- Affinity of herbaceous cover was higher in **breeding season** (ex: Botteri's Sparrow) and Vesper Sparrows in **winter season**
- **Desert scrub species** (ex: Cactus Wren) have a positive affinity with bare ground

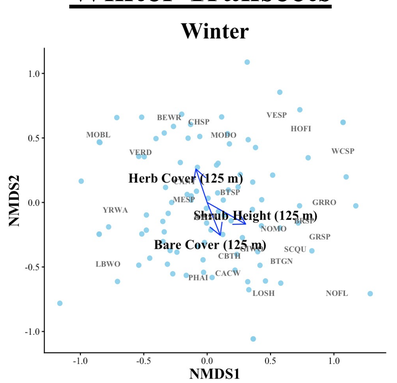
FIGURES

Point Counts



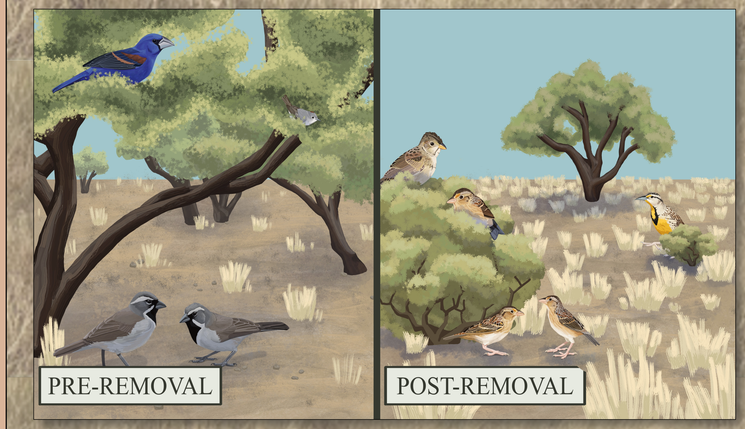
56 SPECIES **49 SPECIES**

Winter Transects



38 SPECIES

Figures depict 2-dimensional NMDS ordinations in each season (stress 0.23-0.27) in which distance between points represents difference among bird communities and blue vectors represent correlation between those communities and habitat metrics. Species four-letter alpha codes are overlaid in ordination space over sites where species is most abundant. Herbaceous (Herb) and Mesquite (Mesq) are left abbreviated.





Lucy's Warbler

Predicted Bird Response to Mesquite Removal[7,8]



Grasshopper Sparrow

NEXT STEPS

- **Mesquite treatment starting October 2026**
  - On-the-ground vegetation surveys in summer 2026 and 2027 to evaluate changes in such cover from mesquite treatment
- Incorporate **distance-based detection probabilities** to correct for detectability
- Inform **stakeholders** on mesquite removal for **improving grassland bird habitat**
- Surveys in future years may be necessary to detect **lagged** effects of **increased herbaceous cover** and **bird abundance**[9]

CONTACT

SOURCES

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