



Small mammal Population Demography and Biomass in Response to Differing Lengths of Prairie Restoration and Management

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Introduction

Background:

- Grasslands, such as prairies, are one of the most endangered types of habitats in North America [1,2,3]
- There is an ongoing effort to search for the best strategy to restore and manage prairies
- Current most common strategies for maintaining prairies are burning and mowing but there are disagreements for lengths of time between
- Small mammals can be used to approximate the efficacy of management efforts due to them being sensitive to changes in their environment [4]



Fig. 1 A snapshot of Prairie Fork

Study Objectives:

Investigate the effects of prairie management on small mammal abundance and richness
Determine whether the time since restoration affects body mass of small mammals

Methods

Field Sampling

- Field work took place in Missouri, at Prairie fork, a prairie restoration, and Tucker prairie, a remnant prairie (say dates)
- Each prairie contains five plots with five transects.
- Each transect has two tomahawks and five Sherman traps
- Small mammal data collected using capture and release live trapping with Sherman and tomahawk traps
- Mammals were temporarily put to sleep with isoflurane anesthesia
- Trapped small mammals were tagged with unique identification number and length, weight, sex, and species collected
- Tissue samples and any ticks infesting



Fig. 2 Image showing trap pick-up at Prairie Fork

Data Analysis

- Abundance:** Total population size for each species in each plot of Tucker Prairie was used. Kruskal-Wallis test used to compare abundance between plots.
- Species diversity:** Shannon-Weiner Diversity Index used to quantify species diversity in each plot. Only data from non-recaptured mammals used. Kruskal-Wallis test used to compare Diversity Indexes between plots.
- Body Mass:** (should I note that some species were excluded?) A two-way analysis of variance (ANOVA) was done to compare sites/species and year/species.
- All data analysis was done in RStudio R 4.1.0

Results

Species Richness

- Plot 4 was the highest in the year 2020 (0.15) and plot 5 was the highest in the year 2021 (0.12)
- Plot 1 was the lowest for both 2020 (0.06) and 2021 (0.05)
- The year 2020 generally was higher in index values in comparison to 2021
- Kruskal-Wallis test revealed that differences in neither year (P-value: 0.35) nor plot (P-value: 0.09) were significant

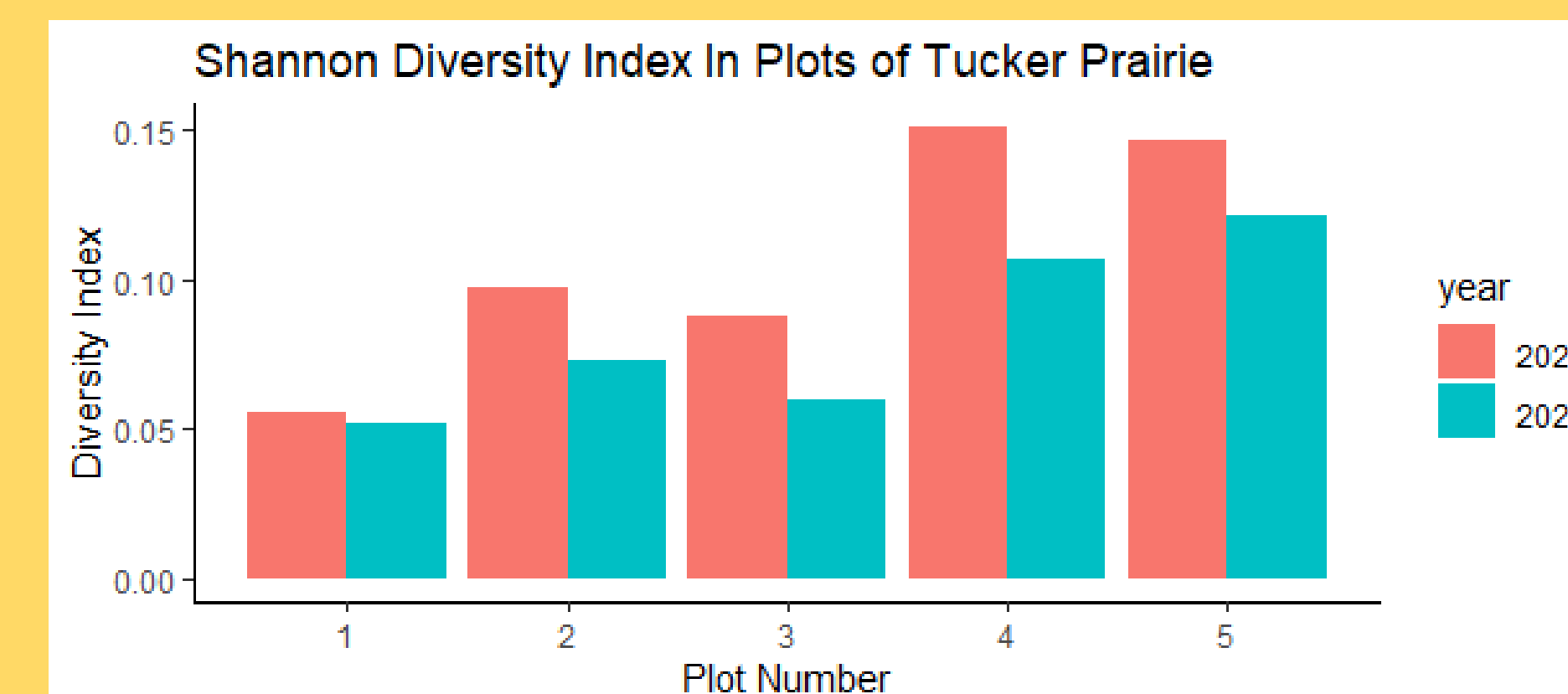


Fig 3. Shannon Diversity Index In Plots of Tucker Prairie. The diversity index for each plot in each year is shown.

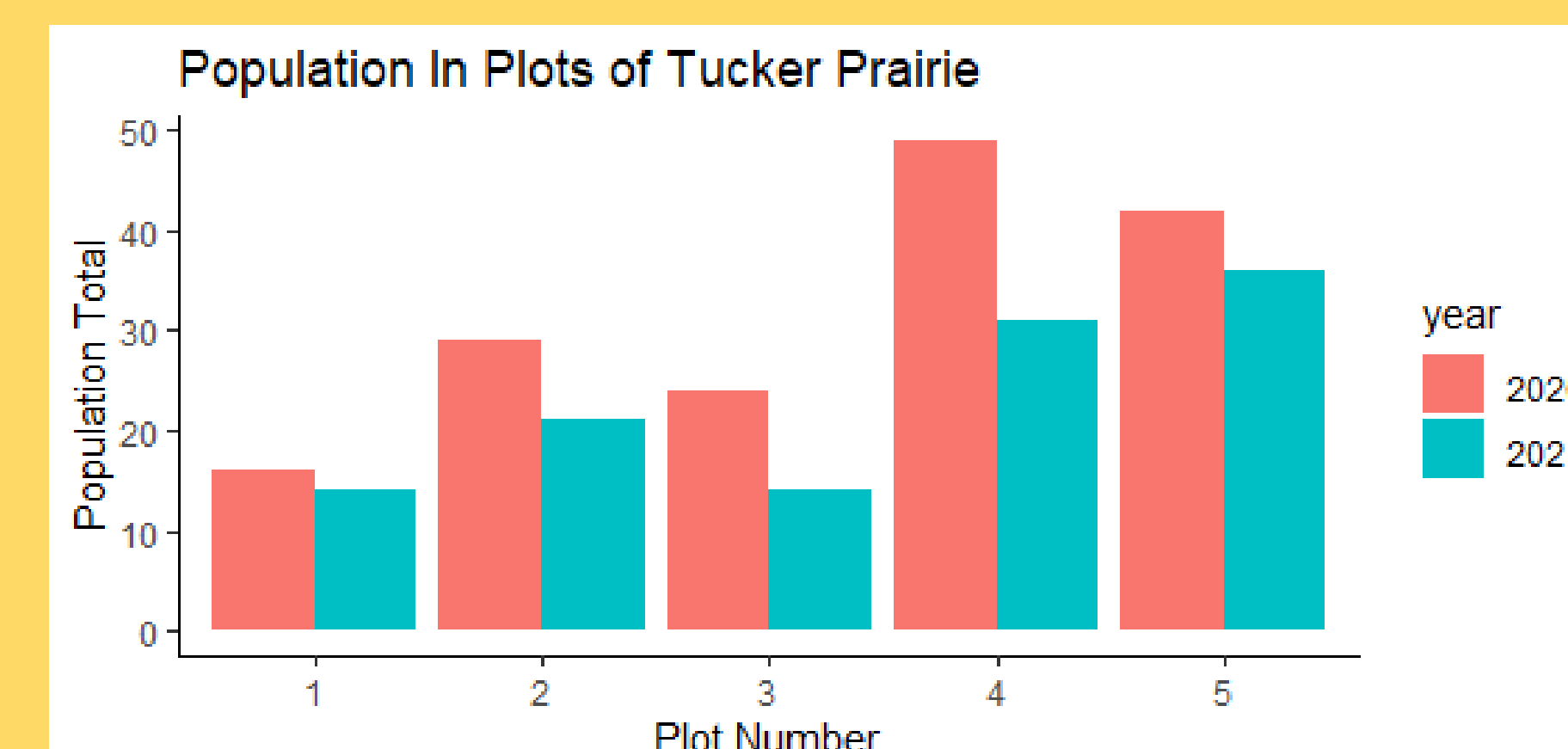


Fig 4. Population In Plots of Tucker Prairie. The total population for each plot in each year is shown.

Abundance

- Plot 4 had the highest total abundance in the year 2020 (49 captured) and plot 5 had the highest abundance in the year 2021 (36 captured)
- Plot 1 had the lowest abundance in the year 2020 (16 captured) and plot 3 had the lowest abundance in the year 2021 (14 captured)
- Kruskal-Wallis test showed that differences in neither year (P-value: 0.46) nor plot (P-value: 0.70) were significant

Biomass

- It was found through a two-way ANOVA that differences in body mass between sites were not significant (P-value: 0.083) but differences between species and year were (P-value: 2E-16 and 6E-4 respectively)
- Species that were captured in both 2020 and 2021 had significantly higher body masses in 2021
- Prairie Voles had the highest body masses while Northern Pygmy Mice had the lowest

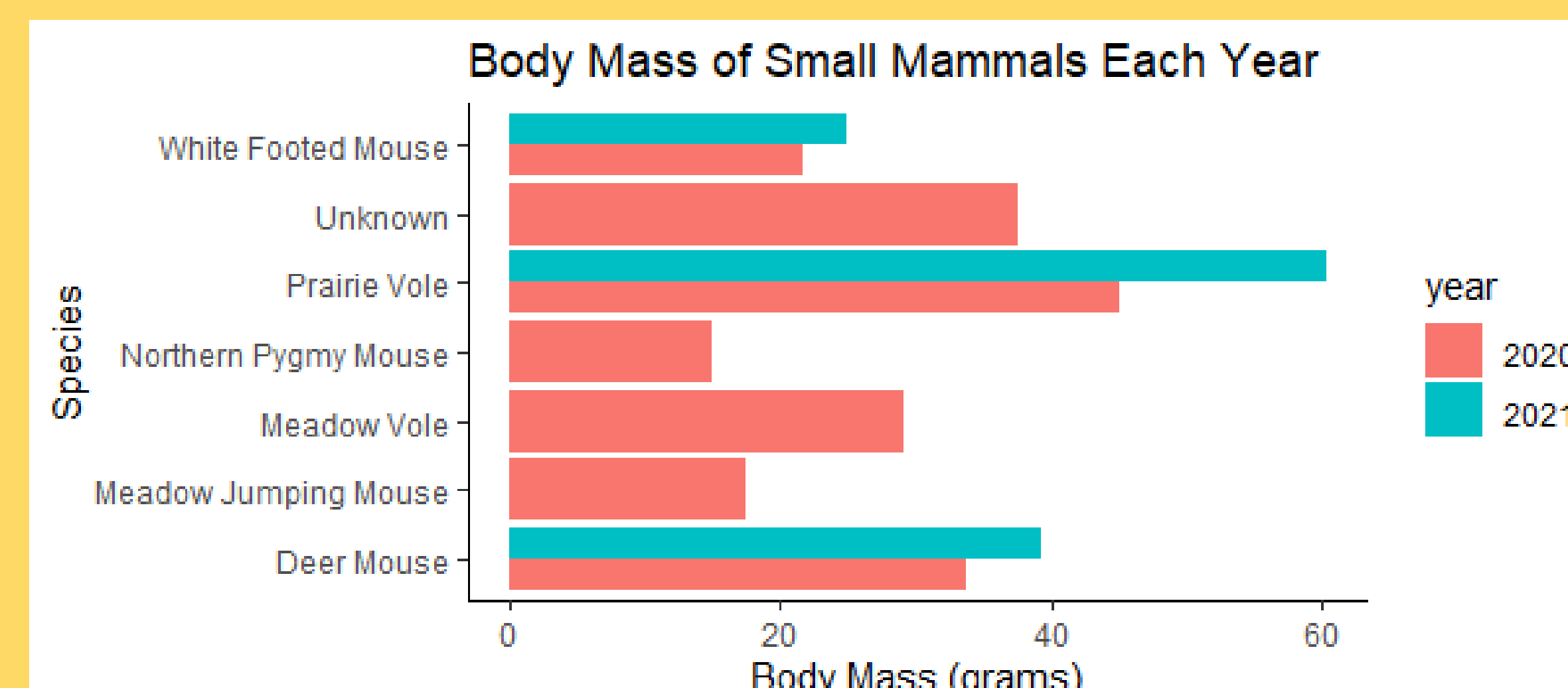


Fig 5. Body Mass of Small Mammals Each Year. The body mass for each species each when captured is shown.

Conclusion

- Differences in species richness and abundance between plots show a potential benefit of burn management
- Differences in species richness and abundance between years suggests that there may be limits to burn management benefits
- Body mass had significant increases over time suggesting that small mammal health may increase over time in actively managed prairies

Future Directions

- I will be focusing on long term effects on small mammals by looking at survivorship
- This study will also include a ranking of variables that most effect small mammal survivorship



Fig 6. Snapshot of Tucker Prairie

References

- Glass, Alex, and Michael W Eichholz. 2021. "Habitat Associations of Small Mammal Communities in a Restored Prairie System in Southern Illinois." Edited by Leslie Carraway. *Journal of Mammalogy*, March, gyab002.
- Matlack, Raymond S., Donald W. Kaufman, and Glennis A. Kaufman. 2008. "Influence of Woody Vegetation on Small Mammals in Tallgrass Prairie." *The American Midland Naturalist* 160 (1): 7–19.
- Richardson, Matthew L. 2010. "Effects of Grassland Succession on Communities of Small Mammals in Illinois, USA." *Biologia* 65 (2): 344–48.
- Thompson, Craig M., and Eric M. Gese. 2013. "Influence of Vegetation Structure on the Small Mammal Community in a Shortgrass Prairie Ecosystem." *Acta Theriologica* 58 (1): 55–61.

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