

Comparison of arthropod diversity and abundance in a heavily grazed pasture and a revegetated pasture in a cross timbers grassland

Mary Wallace¹, Christopher Higgins²

¹ Biology, Transylvania University, Lexington, KY 40508, ² Biological Sciences, Tarleton State University, Stephenville, TX 76402

INTRODUCTION

- Only ~ 30% of the Great Plains region, and less than 27% of Cross Timbers Grassland historical range is estimated to remain (Samson et. al. 2004)
- Overgrazing of cattle and conversion to cropland is the main source of grassland habitat loss (Risser 1988)
- Loss of habitat can have serious consequences for arthropod diversity and abundance, particularly grassland families that are specialist and host specific (Whitcomb et. al. 1994)

RESEARCH OBJECTIVES

- To compare arthropod diversity and abundance in a heavily grazed cattle pasture, and a previously grazed pasture that has been allowed to revegetate without active restoration efforts
- How is invertebrate diversity and abundance impacted when one lets a pasture revegetate on its own without active restoration efforts?

MATERIALS and METHODS

- Timberlake Field Station is located in Mills County, TX, on a working cattle ranch
- One field site is actively grazed by cattle, while the other has revegetated on its own after several years of being fenced off
- The revegetated site has grown a near monoculture of invasive coastal bermuda grass (~80% groundcover), while the actively grazed site was more sparsely populated (~60% groundcover) with bermuda grass, cacti, and small shrubs
- Sampling was completed using pitfall traps filled with soapy water, with arthropods being preserved in 70% ethanol and identified using *Peterson's Field Guide to Insects North of Mexico*

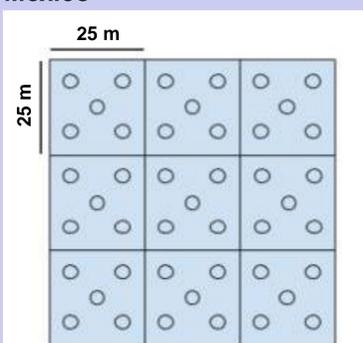
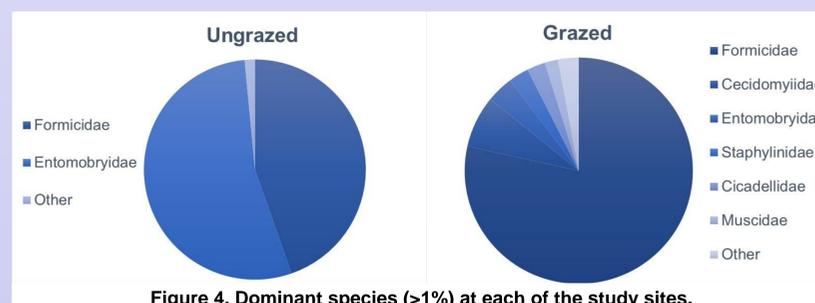
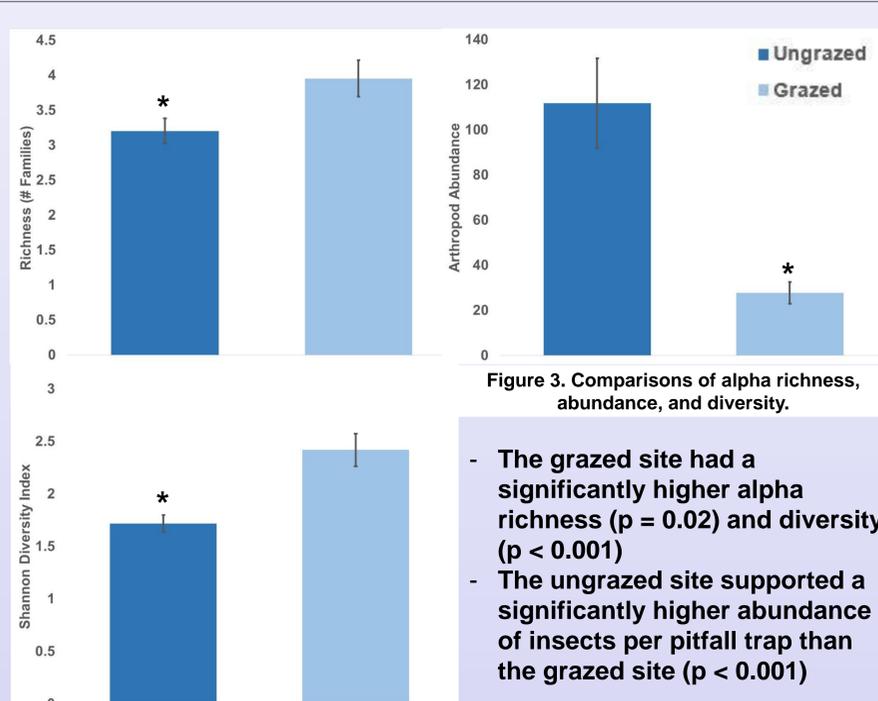


Figure 1. Sampling design. Circles represent pitfall traps in each quadrat.

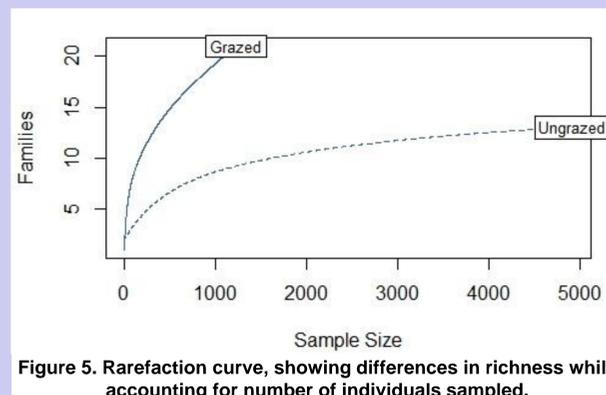


Figure 2. Study sites, ungrazed pasture (top), and grazed (bottom).

RESULTS



- The dominant families at the ungrazed site are made up of only ants and springtails. While the grazed site is also heavily comprised of these two families, it has several others that contribute to the overall composition.



- At equal sample sizes, the grazed site has nearly double the number of families present as the ungrazed site.

CONCLUSIONS

- Tschardt & Greiler (1995) discuss how grazing can impact insect populations by creating a unique mosaic through selective feeding, trampling, and fertilizing
- In this case, the cattle created a mosaic with more unique plant hosts, but less ground cover
- The cattle grazing prevented a monoculture of coastal bermuda grass from forming, therefore there were more plant types present
- The higher abundance of ants and springtails at the ungrazed site is likely due higher ground cover of vegetation, allowing ample, yet homogenous, resources to support larger populations
- If steps were taken to increase the diversity of plants in the ungrazed pasture, one could expect arthropod diversity to increase as well, with the ability to support higher population sizes

FUTURE DIRECTIONS

- Plans are currently being made to utilize different restoration methods at both of the study sites
- The data presented here can be built upon by using it as a comparison point for future arthropod surveys at these sites, post restoration

References

- Risser, P. G. 1988. Diversity in and Among Grasslands. Pages 176–179. E. O. Wilson, editor. *Biodiversity*. National Academies Press.
- Samson, F., F. Knopf, and W. Ostlie. 2004. Great Plains Ecosystem: Past, Present, Future. *Wildlife Society Bulletin* 32:6–15.
- Tschardt, T., H. Greiler. 1995. Insect communities, grasses, and grasslands. *Annual Review of Entomology* 40:535–558.
- Whitcomb, R., A. Hicks, H. D. Blocker, and D. Lynn. 1994. Biogeography of Leafhopper Specialists of the Shortgrass Prairie. *American Entomologist* 19–35.

Acknowledgments

This research was funded by the NSF REU Site: Restoring cattle ranches for sustainable land and water resources (Award #1658984). I would like to thank Dr. Lamar Johanson and Marilyn Johanson for allowing me to complete my field work on their ranch. I would also like to thank Sean Alexander for his assistance in the field work for this project.