

**The Friends of Nachusa Grasslands  
2023 Scientific Research Project Grant Report  
Due June 30, 2024**

Please answer the following questions with clearly written summaries to give Nachusa Friends' science committee members, officers, and board members a good idea of what you accomplished using your grant money. Unless you object to the Friends doing so, your report will be uploaded into the science section of the Friends' website: [nachusagrasslands.org](http://nachusagrasslands.org).

1. Please save this form to your desktop with a unique file name that includes "Friends 2023 Science Grant Report" and your last name.
2. Complete the form using the headings in bold as your guide.
3. Save the file as a Word document or a PDF.
4. Attach the file to an e-mail and send it to: [nachusafriendsscience@gmail.com](mailto:nachusafriendsscience@gmail.com) no later than June 30, 2024.
5. The subject of the e-mail should be "2023 Scientific Research Grant Report" and your last name.
6. If you have not completed your work, please submit this form anyway by the June 30 deadline and plan to contact Friends after your project is complete so that we may learn from and publicize the outcomes as appropriate.

**Name:** Lizzy Small

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**2023 grant amount:** \$3,000

**Research Project Topic:** Small mammal trophic niche dynamics in response to prescribed fire and bison grazing in tallgrass prairie

**Research Project Purpose:**

This study seeks to better understand the interactions between management strategies and small mammals and contributes to a decade's worth of small mammal and plant research conducted at Nachusa Grasslands by Dr. Holly Jones' Evidence-based Restoration Lab. Specifically, I aim to understand how prescribed fire, and grazing, both alone and in combination, impact small mammal communities through changes in trophic niche. In restored prairies, small mammals sit at the center of the food web and are responsible for significant energy flow through the ecosystem. This study will investigate trophic niche dynamics of small mammal assemblages to assess food web responses to prescribed fire and bison grazing, which influence resource availability for consumers.

### **Research Project Outcomes to date:**

I have trained students and volunteers (roughly 30 students per year participate in data collection and analysis) and educated them on grasslands and interactions of species that inhabit this ecosystem.

I have presented preliminary findings at the 2024 Nachusa Grasslands Science Symposium.

I have performed a stable isotope analysis (SIA) and have been working on interpretations of my findings, notably that the white-footed mouse's trophic niche shifts in response to bison grazing from a wide, generalist position (similar to a deer mouse's niche) when bison are present to a narrow, specialist position (similar to a prairie vole's niche) when bison are absent, reflecting the bison's preference for grazing C4 grasses. The outcomes for this project are expected to include a publication about small mammal trophic niche dynamics in response to prescribed fire and bison grazing in grasslands. This study will add to the decade's worth of research conducted by the Evidence-based Restoration Lab at Northern Illinois University.

### **Describe how the grant funds you have received from the Friends of Nachusa Grasslands have been used in regard to the above topic, purpose, and/or outcomes:**

The funds from the Friends of Nachusa Grasslands have allowed me to facilitate this research for 3 sessions of data collection in 2023. This included coordinating and scheduling of volunteers, arranging transportation to and from NIU campus, field gear (boots, rain pants) and PPE (small mammal handling gloves, facemasks, water, sunscreen, bug spray, first aid supplies) for student volunteers, cleaning supplies, data collection materials (clipboard, waterproof paper for data sheets, pencils, permanent markers, plastic bags (2 sizes), envelopes, scales), PIT tags, and Sherman live-traps. Without the generous funds from Friends of Nachusa Grasslands, my colleague Erin Rowland-Schaefer and I would not be able to as comfortably accommodate the volunteers and undergraduate students necessary to complete our data collection sessions. Having field gear available for volunteer use and providing transportation to volunteers allows me to recruit and retain volunteers, and they often have the best time!

### **Describe how your project has benefited the work and goals of Nachusa Grasslands:**

This study allows for a greater understanding of energy flow in grasslands by examining 3 common species located in the center of the food web. This study assesses how management is driving small mammal diets at Nachusa Grasslands. Findings can be used to inform and improve restoration efforts at several sites across Nachusa Grasslands to ensure goals are being met. This project contributes to a decade-long dataset on small mammals and increases knowledge on trophic niches for specialist and generalist species. Such long-term datasets are critical for understanding how management drives patterns we see in small mammals.

**Describe how your findings can be applied to challenges in management practices for restoration effectiveness and species of concern:**

Small mammal species are key members in the prairie community, being both consumers of plants and arthropods, and a food source for predators. An understanding of what influences these species' niche can also help enhance predictions for interactions across species and for species-specific preferences. By being able to predict the impacts of management activities, such as prescribed fire applications and bison grazing, we can predict changes in small mammal niche position at Nachusa Grasslands. This information has implications for entire prairie food webs and management efficacy as small mammals provide food for higher trophic levels and are strong seed predators.

**Please list presentations/posters you have given on your research:**

Lizzy Small, "Small mammal trophic niche dynamics in response to prescribed fire and bison grazing in tallgrass prairie", *Nachusa Grasslands Science Symposium*, Franklin Grove, IL, April 2024

**Have you submitted manuscripts to scientific journals? If so, which ones? If not, do you anticipate doing so?** (Please send digital copies of published articles to the Friends so that we can learn from your work.)

I anticipate submitting my manuscript to *Ecology*, *Trends in Ecology & Evolution*, *Oecologia*, *Conservation Biology*, *Ecology Letters*

**What follow-up research work related to this project do you anticipate (if any)?**

This is an ongoing, long-term research project. Many NIU students have facilitated and participated in this project. I have an NIU undergraduate student that I am mentoring on this project who will continue this line of research questions after I graduate this fall. She will present her findings at NIU CURE conference (undergraduate research conference) in spring of 2025.

**Optional: Suggestions for improving the application and award process for future Friends of Nachusa Grasslands Scientific Research Grants:**

No suggestions, the process went smoothly for me. Thanks!