

**The Friends of Nachusa Grasslands
2024 Scientific Research Project Grant Report
Due June 30, 2025**

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.

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 no later than June 30, 2025.
5. The subject of the e-mail should be "2024 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: Ethan Rose

Address: 820 Smith Ave, Lansing, MI 48910

Phone: 712-266-5820

Current E-mail: roseetha@msu.edu

2024 grant amount:

\$2,000

Research Project Topic:

The role of climate and bison grazing in tallgrass prairies

Research Project Purpose:

The purpose of this research is to understand how bison reintroduction re-shapes the tallgrass prairie ecosystem. Ecological theory suggests that the effects of bison grazing depend on water availability, but little research has tested this. My work compares bison reintroduction effects across the region's rainfall and soil gradients to test whether bison increase plant diversity across the tallgrass prairie region.

Research Project Outcomes to date:

I have found evidence of a strong relationship between the effects of bison on plant diversity and water availability across the region, suggesting that reintroduction efforts can improve management outcomes the most in wet, productive areas. I have presented preliminary findings at the annual symposium at Nachusa and will be giving a talk at ESA 2025.

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:

Grant funding from Friends of Nachusa grasslands has allowed me to hire 2 undergraduate student researchers to assist me in extensively surveying remnant and restored prairie and compare the plant communities here with those at other preserves with reintroduced bison. Without these funds, we would not have generated such valuable data or had the opportunity to train 2 enthusiastic budding ecologists.

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

My project has benefited Nachusa Grasslands by putting this preserve's ecological condition and management outcomes into an ecosystem-wide context. My plant community sampling is standardized across several tallgrass prairie preserves across the Midwest, allowing comparisons between Nachusa Grasslands and nearly all other tallgrass prairies with bison. I have shown that while bison have not significantly increased overall plant diversity due to the site's lower productivity, in line with other findings here, there have also been no negative effects on the quality of the community. Furthermore, I have shown that Nachusa Grasslands has the most diverse and high-quality restored tallgrass prairie with bison.

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

My findings will be applicable to management challenges in grasslands and grazed ecosystems globally. This research bridges a gap between ecological theory and practical application by quantifying bison grazing effects across an ecosystem-wide moisture gradient. The observed differences between dry and wet sites in plant community response (diversity, evenness, floristic quality, and heterogeneity) have important implications for weighing the costs and benefits of reintroducing native herbivores as a restoration tool. Dry, unproductive prairies show little response to bison while wet, productive sites show large increases in diversity. The lack of increase in either highly conservative or weedy exotic species shows that habitat is not degraded by bison, even in the fragmented prairies remaining east of the Mississippi river.

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

"Bison reintroduction outcomes vary across the tallgrass prairie region's productivity gradient", Nachusa Grasslands Science Symposium, April 2025

"Differential bison reintroduction outcomes across the tallgrass prairie productivity gradient", Ecological Society of America Conference, August 2025

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.)

No, but I intend to submit a manuscript adapted from a dissertation chapter on this project.

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

In 2025, I will complete field work for this project by surveying or re-surveying reconstructed prairie units at Nachusa Grasslands and 2-3 other sites. By comparing remnant and reconstructed prairies with bison grazing at every such site with reintroduced bison (incl. Nebraska, Iowa, and Indiana), we can further test the utility of bison as a restoration tool at multiple stages of community assembly.

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

NA 😊