

**The Friends of Nachusa Grasslands  
2020 Scientific Research Project Grant Report  
Due June 30, 2021**

1. Please save this form to your desktop with a unique file name that includes “Friends 2020 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, 2021.
5. The subject of the e-mail should be “2020 Scientific Research Grant Report” and your last name.
6. After your research project is complete, please contact Friends so that we may learn from and publicize the outcomes as appropriate.

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**2020 grant amount: \$2350.00**

Please answer the following questions with 1- to 2- sentence summaries:

**Research Project Topic:** The effect of restoration management practices on soil microbial community structure and function, with a specific focus on soil nutrient changes especially as can be seen in soil nitrogen and carbon concentrations.

**Research Project Purpose:** To provide restoration managers with information on the effects of prairie restoration on microbial communities and nutrient cycling within soil.

**Research Project Outcomes to date:** The carbon and nitrogen content has been incorporated with fire regimes and bison presence/absence to understand the effect of these disruptions on soil nutrients and microbial communities. Analyses reveal that the ratio of soil C:N increases significantly more with burning than age alone. Increases in soil C:N in sites with bison presence are not significantly different than sites without bison.

**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:** Funding was used to measure carbon and nitrogen concentrations and isotopic values for soil samples from 2013-2020. Values were measured using the Elemental Combustion System (ECS 4010, Costech Instruments) coupled to the Delta Plus Advantage IRMS (Thermo Fisher Scientific) at Northern Illinois University’s Geological Sciences Analytical Lab.

**Describe how your project has benefited the work and goals of Nachusa Grasslands:** Knowledge of the effects of burning and bison presence on changes in soil

C:N ratio are useful as an outreach and education activity for restoration managers to use with general audiences, for example in the context of climate change impacts. Soil nutrient data also allow for more focused assessment of soil health, providing an additional lens through which land managers may view impacts of restoration practices on the overall ecosystem.

**Describe how your findings can be applied to challenges in management practices for restoration effectiveness and species of concern:** These results suggest that prescribed burning accelerates soil C:N increases that occur with age, potentially depleting N needed for microbial and plant community growth in older restorations. However, initial microbial community analysis suggests that while these increases may be causing changes in taxonomic diversity of microbial groups, functional diversity may be maintained. Continued analysis of the links between microbial community abundance and shifts in C:N aim to elucidate the effects of prescribed burning on microbial functional diversity and their downstream effects on plant and animal communities.

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

Klimek, D., Barber, N., Swingley, W., 2021. "Microbial Nutrient Cycling and Soil Geochemistry as Indicators of Prairie Restoration Success." Nachusa Grasslands Science Symposium. Virtual. April 24, 2021.

Klimek, D. & Swingley, W., 2020. "Long Term Observation of Microbial Communities in Restored Tallgrass Prairie." Midwest Ecology and Evolution Conference. Western Illinois University, Macomb, IL. February 29, 2020.

**Have you submitted manuscripts to scientific journals? If so, which ones? If not, do you anticipate doing so?**

**Noe** (Please send digital copies of published articles to the Friends so that we can learn from your work.)

Manuscripts have not been submitted, but we do anticipate doing so and will be sure to communicate any such publications with the Friends of Nachusa Grasslands.

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

Analysis of these data is ongoing and will be incorporated with data from soil samples collected at The Nachusa Grasslands in 2021 and beyond.

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