The Friends of Nachusa Grasslands
2015 Scientific Research Project Grant Report
Due June 30, 2016

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2015 grant amount: $750

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

Research Project Topic: Impacts of bison on dung beetle community assembly in restored and remnant tallgrass prairies.

Research Project Purpose: This project had three purposes. The first was to establish protocols to collect dung beetles in prairie restoration, remnant, and agricultural field habitats. The second purpose was to begin a general survey of dung beetle species at Nachusa to identify which species are present. The third purpose was to test is restoration age and presence of bison influenced dung beetle abundance and richness.

Research Project Outcomes to date: We successfully trapped dung beetles in all 10 sites (4 restorations with bison, 4 without bison, 1 remnant, and 1 agricultural field). All beetles were pinned and identified to species at NIU and used to establish a reference collection for future studies. We identified 6 species of dung beetle, with the highest abundance in the main unit remnant, possibly due to the adjacent cattle pasture, which may act as a reservoir given the high density of cattle dung. There were no differences in abundance or species richness between restorations with and without bison, and no relationship with age of the restoration. The agricultural field had very few dung beetles, and only a single species was recorded.

The project also provided an educational opportunity for a NIU undergraduate student who participated in trapping, pinning, and identifying specimens. He will be presenting the results of this project at NIU's Undergraduate Research & Artistry Day in April 2016.

The project will be expanded to include more sites in 2016 and provide a more complete and comprehensive survey of this community. I anticipate documenting additional species, and studying more sites will allow me to test the hypothesis that adjacency to a cattle pasture is an important determinant of dung beetle abundance.

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: Funds provided by the Friends of Nachusa Grassland were used to purchase trapping materials, insect specimen materials (pins, pinning boxes), and for travel cost reimbursement between NIU and Nachusa.

Describe how your project has benefited the work and goals of Nachusa Grasslands: Nachusa Grassland provides an opportunity to investigate fundamental questions in ecology, including the processes that drive community assembly. Uniquely, this site also allows these questions to be placed within a restoration ecology context and provide managers with information about the organisms inhabiting the site and how their management activities may affect these components of biodiversity.

Describe how your findings can be applied to challenges in management practices for restoration effectiveness and species of concern: Dung beetles provide important ecosystem functions by processing and feeding on animal dung. These activities return nutrients to the soil and thus have the potential to drive plant community dynamics. However, dung beetles in temperature ecosystems are not as well-studied as those in tropical habitats, and there has been almost no investigation into their re-colonization of restored habitats. Perhaps most importantly, the results of my study suggest that nearby cattle pastures may be an important source of colonists for this important group of insects. Given the relative isolation of most prairie preserves and restorations in the Midwest, this may be a positive sign that livestock operations near prairies can benefit ecosystem recovery by aiding in the re-establishment of these important animals.

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

Luzbetak, D. and N. A. Barber. 2016. Recovery of dung beetles in tallgrass prairie restorations at Nachusa Grasslands. NIU Undergraduate Research & Artistry Day. (poster)

Preliminary results were also briefly discussed in another conference presentation focusing on research into another beetle group at Nachusa:

Barber, N. A., K. A. Lamagdeleine, and K. W. McCravy. 2016. Species and functional trait composition of Carabidae communities in a tallgrass prairie restoration chronosequence. Ecological Society of America, Baltimore, MD.

Have you submitted manuscripts to scientific journals? If so, which ones? If not, do you anticipate doing so? (Please keep us informed on publications.**)**

This research has not been submitted for publication, but one manuscript focusing on another beetle group is in preparation with a targeted submission of April 2016, and another manuscript focusing on plant communities was recently published:

Barber, N. A., H. P. Jones, M. R. Duvall, W. P. Wysocki, M. J. Hansen, D. J. Gibson. 2016. Phylogenetic diversity is maintained despite richness losses in restored tallgrass prairie plant communities. Journal of Applied Ecology. doi:10.1111/1365-2664.12639

Barber, N. A., K. A. Lamagdeleine, J. E. Willand, and K. W. McCravy. In preparation. Species and functional trait re-assembly of ground beetle communities in restored grasslands. Plan to submit to Restoration Ecology

<u>Optional</u>: Offer suggestions for improving the application and award process for future Friends of Nachusa Grasslands Scientific Research Grants: This is a great

program that is one of the reasons Nachusa is such a success story and has such a strong community of managers, volunteers, stewards, and scientists. I especially appreciate how it allows graduate students to fund their own projects, something that rarely happens in many other areas of science. This gives them the opportunity to pursue research projects close to their own interests and develop into independent researchers rather than have to carry out work on someone else's ideas.