

The Friends of Nachusa Grasslands 2015 Scientific Research Project Grant Report

Name: Bethanne Bruninga-Socular

2015 grant amount: \$2000

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

Research Project Topic: Conservation of native pollinators: the effects of restoration on bee communities of a tallgrass prairie

Research Project Purpose: 1) To describe the bee community (species identities and relative abundances) at Nachusa Grasslands, 2) To assess bee responses to restoration of the plant community in prairie plots since the 1980s, 3) To analyze bee community composition and species richness as functions of restored prairie plot age (time since plant restoration), current flowering plant community, and ongoing management practices including fire frequency and bison grazing.

Research Project Outcomes to date: This is an ongoing project. Our outcomes are as follows:

- 1) Griffin, Sean. Conservation of native pollinators: effects of restoration on bee communities of a tallgrass prairie. Master's degree thesis. Rutgers University: New Brunswick, NJ. April 2015.
- 2) Bruninga-Socular, B., S. Griffin, M. Kerr, J. Gibbs, R. Winfree. Conservation of native pollinators: effects of restoration on bee communities of a tallgrass prairie. Annual Science Meeting. Nachusa Grasslands: Franklin Grove, IL. July 25, 2015. (BBS presented)
- 3) Bruninga-Socular, B., S. Griffin, M. Kerr, J. Gibbs, R. Winfree. Conservation of native pollinators: effects of restoration on bee communities of a tallgrass prairie. Society for Ecological Restoration World Conference poster session. Manchester Metropolitan University: Manchester, U.K. August 26, 2015. (BBS presented)
- 4) Griffin, S., B. Bruninga-Socular, M. Kerr, J. Gibbs, R. Winfree. Wild bee community change over a 26 year chronosequence of restored tallgrass prairie. Nachusa Science Symposium: Franklin Grove, IL. October 24, 2015. (SG presented)
- 5) Griffin, S., B. Bruninga-Socular, M. Kerr, J. Gibbs, R. Winfree. Wild bee community change over a 26 year chronosequence of restored tallgrass prairie. Entomological Society of America Annual Meeting. Minneapolis, Minnesota. November 18, 2015. (SG presented)

6) Griffin, S., B. Bruninga-Socolar, M. Kerr, J. Gibbs, R. Winfree. *In 2nd round of review*. Wild bee community change over a 26 year chronosequence of restored tallgrass prairie. *Restoration Ecology*.

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 grant funds that we received to fund our 2015 field season were used to conduct 8 rounds of bee sampling at Nachusa from May through August 2015 (two per month). Each bee sampling round consisted of placing bee traps at 19 restored prairie, remnant prairie, and agricultural sites for a period of 24 hours. In addition, a plant survey was done at each trapping location in eight 1x1 meter quadrats, recording plant species and percent ground cover within each quadrat. We used the Friends of Nachusa funds to hire a part-time field technician, Michael Saxton, to conduct both the bee sampling and the plant surveys for summer 2015, amounting to approximately 4 full days of work every 2 weeks. We are conducting the same field work this summer, 2016, and will use these two years of data to follow up on our existing publication (see #6 above) to determine whether the hyper-local plant community in prairie restoration plots and remnants determines bee community composition and richness at those sites.

We will soon have three years of data at Nachusa (2014-2016) encompassing a pre-bison field season and two years of bison, with plots both within and without the bison enclosure. We plan to use this dataset to determine the short-term effects of bison on the bee community at Nachusa, if short-term effects exist, and also to determine the short-term effects of prescribed fires at Nachusa on the bee community.

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

We have compiled a list of bee species (>80 bee species!) at Nachusa and their relative abundances, as determined by their frequency in our traps. We would like to make this available to Nachusa staff and volunteers, including a sample bee collection, so that others can enjoy the diverse bee community on the prairie.

Our results have shown that prairie restoration at Nachusa has successfully restored the bee community to match the species and abundances remaining in the remnant prairie, i.e. restoration practices at Nachusa work for bees. Likely, the connectedness of Nachusa has contributed greatly to maintaining the diverse bee community there. We anticipate that the results of our analyses of the effects of bison and fire management practices will provide more nuanced information about how this ecosystem service-providing taxon responds both short-term and long-term to these common prairie management practices.

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

In light of worldwide concern about pollinator declines, bee conservation and restoration has become an important goal in its own right. It is therefore necessary to assess whether current restoration methods are positively affecting bee communities, and whether these methods return bee communities to those found in remnant habitats, as our study at Nachusa has found. In addition, because pollinators are essential to the functioning of many natural plant communities, diverse pollinator communities may be necessary for the successful restoration of prairie communities and their long-term maintenance. Our research provides valuable information about how bees respond to restoration, which can be used to both assess restoration success and optimize management of restorations.

Aside from bumblebees (genus *Bombus*) and commercially important bee species, we have so little information about most bee species that assessments of species vulnerability to challenges such as habitat change, climate change, etc. are impossible to conduct. Our study is documenting bee community and species trends in restored prairie and could be used to inform conservation decisions for species of interest.

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

Please see outcomes list above.

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

Please #6 in our list of outcomes above. Note that the data in this publication were collected in 2014 and were funded by Prairie Biotic Research, Inc., a Theodore Roosevelt Award from the American Museum of Natural History, and Rutgers University. The Friends of Nachusa Grasslands provided the bulk of the funding for our 2015 and 2016 field seasons, which have not resulted in presentations or publications yet (but see description of use of grant funds above for a brief description of our planned analyses, which will be presented at conferences and in scientific journals).

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

We have found this process to be painless, as far as grant applications go! Thank you so much for providing these funds for researchers. We (Bethanne Bruninga-Socolar and Sean Griffin) are extremely grateful. We especially appreciate the warm support, both financially and otherwise, that grad students in particular have received for research at Nachusa.