

**The Friends of Nachusa Grasslands
2016 Scientific Research Project Grant Report
Due June 30, 2017**

Name: Bethanne Bruninga-Socolar, Grantee (Co-Investigator: Sean Griffin)
Address: 14 College Farm Rd. New Brunswick, NJ 08901
Phone: 443-433-8262 **E-mail:** bethanne.ab@gmail.com

2016 grant amount: \$3,340

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

Research Project Topic: Over the past 4 years (2013-2016), we have collected a dataset to look at the effects of restoration and surrounding land use on bee communities of the tallgrass prairie at Nachusa. We are now using that data, including the data we collected in 2016 supported by a Friends Science Grant, to analyze the impact of bison on bee communities.

Research Project Purpose: Native bees are highly dependent on flowering plants for food during all parts of their life cycles and on the availability of species-specific nesting sites and materials (e.g. wood and grass stems for stem-nesting bees, bare loose soil for ground-nesting bees). Restoration efforts at Nachusa, including the time since planting, fire frequency, and presence of bison, affect the availability of food and nesting resources for bees. Our ongoing project aims to assess the impacts of tallgrass prairie restoration on bees to provide information about specific management actions and to fill a crucial gap in our knowledge of native bee ecology: tallgrass prairie was once the dominant vegetative province over much of the Midwestern United States but the native bee community has not been studied despite its importance for maintaining pollination services and the long-term persistence of prairie plant communities.

Research Project Outcomes to date:

Peer-reviewed publications (1&2 use data supported by our 2015 & 2016 Friends Grants)
1 – **Bruninga-Socolar, B.**, S.R. Griffin, & J. Gibbs. (*In prep – expected submission Nov. 2017*) The role of functional traits in bee community assembly of a restored tallgrass prairie.

2 – Griffin, S.R., **B. Bruninga-Socolar**, J. Gibbs. (*In prep – expected submission Nov. 2017*) Direct and indirect effects of restoration management on wild bee communities of a tallgrass prairie.

3 – Griffin, S.R., **B. Bruninga-Socolar**, M. Kerr, J. Gibbs, and R. Winfree. 2017. Wild bee community change over a 26 year chronosequence of restored tallgrass prairie. *Restoration Ecology*. DOI: 10.1111/rec.12481.

Presentations (* indicates presenting author; 1&2 use data supported by our 2015 & 2016 Friends Grants)

1 – **Bruninga-Socolar, B.***, S.R. Griffin, & J. Gibbs. The role of functional traits in bee community assembly of a restored tallgrass prairie. Ecological Society of America Annual Meeting. Portland, OR. Aug. 10, 2017.

2 – Griffin, S.R.*, **B. Bruninga-Socolar**, & J. Gibbs. Direct and indirect effects of restoration management on wild bee communities of tallgrass prairie. Ecological Society of American Annual Meeting. Portland, OR. Aug. 10, 2017.

3 – **Bruninga-Socolar, B.***, Effects of restoration on bee communities: future directions. Nachusa Grasslands Science Symposium. Franklin Grove, IL. Oct. 22, 2016.

4 – **Bruninga-Socolar, B.***, S.R. 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 (SER) World Conference. Manchester Metropolitan University: Manchester, U.K. Aug. 26, 2015. (*poster*)

5 – Griffin, S.R.*, **B. Bruninga-Socolar**, M. Kerr, J. Gibbs, & R. Winfree. Conservation of native pollinators: effects of restoration on bee communities of a tallgrass prairie. Entomological Society of America Annual Meeting. Minneapolis, MN. Nov. 18, 2015.

6 – Griffin, S.R.*, **B. Bruninga-Socolar**, M. Kerr, J. Gibbs, & R. Winfree. Conservation of native pollinators: effects of restoration on bee communities of a tallgrass prairie. Nachusa Grasslands Science Symposium. Franklin Grove, IL. Oct. 24, 2015.

7 – Griffin, S.R., **B. Bruninga-Socolar, B.***, M. Kerr, J. Gibbs, & R. Winfree. Conservation of native pollinators: effects of restoration on bee communities of a tallgrass prairie. Friends of Nachusa Grasslands Annual Meeting. Franklin Grove, IL. Jul. 25, 2015.

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:

In 2016, our Science Grant was principally used to employ a part-time field technician, Kaleb Baker, to conduct eight rounds of native bee sampling May through August, 2016. Each round of sampling consisted of 3-4 days of full-time work and sampling rounds were spaced approximately every 2 weeks throughout the summer. During each sampling round, Kaleb placed 4 bee traps for a 24-hour period at each of 20 sites: 14 plantings, 3 remnants, and 3 nearby agricultural fields. He also conducted basic plant sampling during each round consisting of recording plant diversity and abundance in eight 1 m² quadrats at each site. We also used some of the funds to cover contracting fees for a professional

taxonomist, Jason Gibbs (Assistant Professor, University of Manitoba), to identify bees to species in the unresolved group *Lasioglossum* (*Dialictus*), of which we have found 22 species at Nachusa. Jason is the only person who can identify those bees to species-level.

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

Cumulatively since 2013, our project has generated a species list of 93 bee species in 29 genera, contributing meaningfully to the faunal records at Nachusa. In our first published paper (Griffin et al. 2017 *Restoration Ecology*), we found that current prairie restoration practice of planting diverse forb species successfully recovers and maintains a bee community that matches that found in remnant prairie at Nachusa.

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

Our ongoing analyses (see items 1&2 under publications and presentations, above) use our combined dataset of bee specimens from 2015 & 2016 along with the associated plant sampling to explore the relative effects of different management practices (planting & burning) on native bees and to assess whether the bison are starting to have an effect on the bee community. These analyses, when complete, will provide a quantitative measure of the effects of prairie management on the native bee community. In addition, these analyses will contribute to our understanding of the ecological function of bison. We need to understand the role that bison play in their ecological community in order to assess the recovery and future conservation of this species of concern.

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

Please see the publications and presentations listed under “Project Outcomes” 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.)

We have published 1 manuscript in *Restoration Ecology* (item 3 in publications list above). We are currently actively preparing two manuscripts for publication (items 1 & 2 in publications list above). We plan to submit item 1 to either *Restoration Ecology* or *Ecological Applications* depending on the final results of the analyses, and item 2 to *Journal of Applied Ecology*. We hope to submit these manuscripts in November 2017 after presenting the results for both at the Ecological Society of America Annual Meeting in Portland, OR in August 2017 (see presentations list under “Project Outcomes”).

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

We have been very happy with the application and award process, and thank the Friends for their continued support of our research at Nachusa.