

**The Friends of Nachusa Grasslands
2021 Scientific Research Project Grant Report
Due June 30, 2022**

1. Please save this form to your desktop with a unique file name that includes “Friends 2021 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, 2022.
5. The subject of the e-mail should be “2021 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.

Name: Sean Griffin

Address: Lady Bird Johnson Wildflower Center,
4801 La Crosse Ave, Austin, TX 78739

Phone: 301-706-7467

Current E-mail: sgriffin@wildflower.org

2021 grant amount: \$13,800

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

Research Project Topic:

Little is known about how bees of high conservation interest, such as floral specialists or bees experiencing population declines, are distributed across protected or restored landscapes. We studied rare and declining bees at Nachusa to gain insight into the life history of these species, and to understand how habitat and management may be better targeted towards these at-risk groups in the face of continued global change.

Research Project Purpose:

Dr. Bethanne Bruninga-Socolar and I have monitored bee communities within restored prairies at Nachusa since 2013, but most of this work has focused on common species. To gain a better understanding of the specialized or declining bees at Nachusa, in 2021 we rehired our two highly-motivated technicians from 2020, Josh Klostermann and Chan Dolan, and hired an additional technician (Sam Wilhelm), to lead three projects focused on these rare groups.

1. Monitoring habitat and dietary specialists:

In summer 2020 and 2021, Josh conducted targeted sampling of habitat types, locations, and floral hosts not previously sampled in our long-term monitoring project, with the goal of identifying rare species and describing the full diversity of bees at Nachusa.

2. Characterizing insect communities of bison wallows

In summer 2020, Josh discovered that bison wallows host an extraordinary amount of biodiversity, particularly for sand-nesting bees and wasps. To characterize these communities, in 2021 he conducted standardized observations and insect collections across wallows of various sizes, shapes, and orientations across the preserve. Given that there has been little study of wallows, these findings will give significant insight into the value of these unique habitats within protected and recovering grasslands.

3. Bumble bee monitoring

In 2021, we specifically focused our bumble-bee work on rare and threatened species by concentrating on previously under-sampled habitats such as forest and savanna. We also added a community science component by leading a day-long bumble bee workshop for volunteers. Collectively, these efforts at Nachusa allowed us to comprehensively monitor bumble bees to understand aspects of their life history such as associations with specific flower species, habitat usage, and general distribution across restored landscapes. A greater understanding of these bees will better enable conservation and habitat restoration for these important pollinators.

Research Project Outcomes to date:

1. Monitoring habitat and dietary specialists:

In 2021, Josh collected over 400 specimens, and identified at least 11 species that were new records for Nachusa:

1. *Brachymelecta californica*
2. *Anthophora abrupta*
3. *Lasioglossum swenki*
4. *Protandrena cockerelli*
5. *Xylocopa virginica*
6. *Hoplitis micheneri*
7. *Triepeolus remigatus*
8. *Epeoplus ainsliei*
9. *Perdita halictoides*
10. *Megachile rugifrons*
11. *Sphexcodes aroniae*

Josh also located a population of *Macropis* sp., an oil-collecting specialist of *Lysimachia*, in the fens at Nachusa. These observations and locations were shared with Dr. Rob Jean and Laura Rericha-Anchor to aid their studies of this rare bee.

2. Characterizing insect communities of bison wallows

In 2021, Josh collected at least ~550 wasp and bee individuals across 20 bison wallows at Nachusa. Though he has not yet identified all specimens, the results from this project will give insight into community composition within bison wallows, and the environmental factors that affect the diversity and interactions within these communities.

Further, Josh discovered a previously unknown interaction between two bee species in bison wallows: cleptoparasitism by a parasitic bee species, *Nomada banksi*, on a sand-nesting species, *Andrena asteris*. He is currently preparing this novel observation for publication as a natural history note.

3. Bumble bee monitoring

Through our targeted observations, we located a total of 56 Rusty Patch Bumble bees spread throughout the preserve.

Chand and Sam also conducted standardized surveys of bumble bees and flowers across the preserve to obtain a detailed picture of the resources used by various bee species across four different habitats at Nachusa. These surveys yielded 2,238 observations of individual foraging bumble bees of 11 different species. We are still in the early stages of analyzing these data, but are particularly interested in the distribution of floral abundance and diversity across Nachusa. Surprisingly, we found that the total abundance of flowers was similar across the different habitats, but that richness was significantly higher in prairie and savannah than in wetland or forest sites (Fig. 1). In the coming months, we plan to examine whether differences in floral richness and plant community composition drive changes in the bumble bee communities between these different sites.

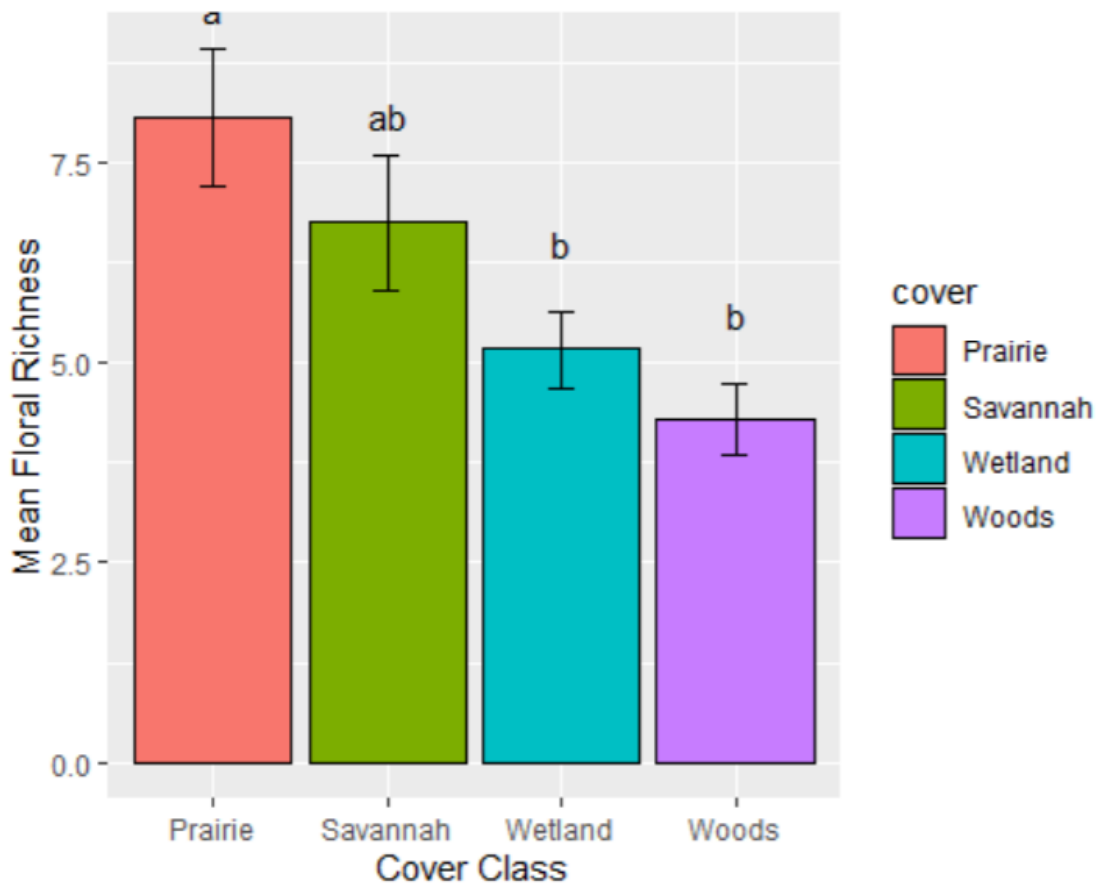


Figure 1. Floral richness within each of the four focal habitats.

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 funds from the Friends of Nachusa were instrumental in allowing us to conduct this work, and were used primarily to pay the summer stipends for our three technicians (\$12/hr). We used the remaining funding to pay for field and lab equipment.

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

Our work primarily benefits the work and goals of Nachusa by providing a better understanding of the rare and at-risk species that are protected by the preserve. Our work in 2021 led to the identification of 11 species previously unknown at Nachusa, observations of previously undescribed interactions and habitat usage, and a map of where the federally endangered Rusty Patch Bumble bee is found on site. All of these findings provide testament to the importance of Nachusa's mission to restore high-quality tallgrass prairie, and a greater understanding of how land management benefits species of concern.

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

Through our work, we identified key habitats such as fens, patches of forest, and bison wallows that contained high numbers of rare bees. We also determined specific drivers of rare bumble bee distribution, such as habitat edges and important host plants. These findings can guide restoration actions at Nachusa by helping practitioners prioritize certain habitats and management actions, and these data also provide a baseline for monitoring the population dynamics of species of concern.

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

Bruninga-Socolar B, Griffin S, Gibbs J. Bees in restored tallgrass prairie: Lessons learned from 8 years of fieldwork in Illinois. University of Minnesota, Entomology Department seminar. February 16, 2021 (**Note:** this talk is publicly available on Youtube: <https://www.youtube.com/watch?v=Hm0J2T01zoU>)

Griffin S, Bruninga-Socolar B, Gibbs J. Wild bee communities at the Nachusa Grasslands are structured by landscape and management rather than local flower communities. Nachusa Grasslands Virtual Science Symposium. April 24, 2021

Bruninga-Socolar B, Griffin S, Gibbs J. Little bees on the prairie: restoring a native pollinator community. Invited talk, Hobart & William Smith Colleges. May 13, 2021

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.)

Bruninga-Socolar B, Griffin S, Portman Z, Gibbs J. 2021. Variation in prescribed fire and bison grazing supports multiple bee nesting groups in tallgrass prairie. *Restoration Ecology*

Griffin S, Bruninga-Socolar B, Gibbs J. (2021) Bee communities in restored prairies are structured by landscape and management, not local floral resources. *Basic & Applied Ecology* 50: 144-154.

Griffin S, Bruninga-Socolar B, Kerr MA, Gibbs J, Winfree R. (2017) Wild bee community change over a 26-year chronosequence of restored tallgrass prairie. *Restoration Ecology* 25: 650-660.

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

We do not anticipate any follow-up research for these projects at this time. However, we are planning to continue our long-term bee monitoring study in summer 2023, which has been on hiatus since 2020. Now that we have about 10 years of data, we have decided to move our collections for that project to a 3-year schedule.

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