

**The Friends of Nachusa Grasslands
2018 Scientific Research Project Grant Report
Due June 30, 2019**

1. Please save this form to your desktop with a unique file name that includes “Friends 2018 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, 2019.
5. The subject of the e-mail should be “2018 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: Nathalie Baena-Bejarano (PhD student), Catherine Dana (PhD student), and Sam Heads (PI)

Address: Illinois Natural History Survey, 1816 South Oak Street, Champaign IL, 61820 USA

Phone: (217) 300-7692

E-mail: baena2@illinois.edu & cdana2@illinois.edu

2018 grant amount: \$5000

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

Research Project Topic: Documenting rare and habitat specific orthopterans and true bugs in the Nachusa Grasslands

Research Project Purpose: Orthopterans (crickets, grasshoppers and relatives) and hemipterans (true bugs, leaf-footed bugs, cicadas, and relatives) are important groups of insects. However, there are many gaps in the knowledge of diversity and distribution of these organisms across Illinois. The heterogeneous and extensive landscapes of Nachusa Grasslands Nature Preserve provide diverse areas for habitat specialized organisms. In our study we aim to survey the presence of habitat specialized orthopterans (with an emphasis on pygmy grasshoppers and pygmy mole crickets) and true bugs (with an emphasis on cicadas). To use molecular techniques in the measurement of divergence and delimitation of populations and species of pygmy mole crickets and cicadas from Nachusa and other localities in Illinois.

Research Project Outcomes to date: To date we have recorded the riparian orthopteran species *Ellipes minuta minuta* (pygmy mole cricket) and the habitat specialized cicada species *Megatibicen auletes* (Northern dusk singing cicada, a specialist on oak) from Nachusa Grasslands. We also identified the presence of three species of cicadas (*Neotibicen pruinosus*, *Neotibicen linnei*, and *Neotibicen canicularis*) that are extremely

similar in appearance and two of which are very genetically similar. It has been proposed that these might hybridize, but genetic work on this is still ongoing. Other orthopterans were sorted and identified to family (Excel file attached) – data on hemipterans will be provided when it has been completed. Genetic distance from ~700 bp COI of samples from Nachusa Grasslands showed that samples of pygmy mole crickets corresponded to the same species across Illinois (*Ellipes minuta minuta*).

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 were used toward sampling efforts such as transportation, material for preservation of samples (ethanol, vials, labelling tape and paper). Laboratory analyses materials for DNA extraction, primers for COI and microsatellites, PCR, electrophoresis gel materials, and sequencing.

Describe how your project has benefited the work and goals of Nachusa Grasslands: This research provided a baseline inventory of pygmy mole cricket and cicada diversity from Nachusa Grasslands. This baseline data is important for conservation purposes and long term monitoring. Future research could focus on long-term effects of prescribed burning on these taxa or on the connectivity between populations of these organisms.

Describe how your findings can be applied to challenges in management practices for restoration effectiveness and species of concern: Our findings are still in an initial stage to provide conclusive management practices. We found that pygmy mole crickets are colonizing newly created “wetland” areas in Nachusa (near the “contraption”, i.e. the west edge of “Prairie Potholes”) -- although details on their dispersal is unknown. Additionally, both pygmy mole crickets and especially the large bodied cicadas are important for nutrient cycling. Cicadas can be a large food source for a number of birds, small mammals, snakes, and other arthropods. There is still much unknown about the level of decomposition services that pygmy mole crickets provide along creeks and streams.

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

- Dana, C., Baena-Bejarano, N. 2018. Cicadas of Nachusa Grasslands. Nachusa Grasslands Science Symposium.
- Baena-Bejarano, N., Dana, C. 2018. Pygmy mole crickets and other relatives (Orthoptera: Caelifera) from Nachusa Grasslands. Nachusa Grasslands Science Symposium.

Have you submitted manuscripts to scientific journals? If so, which ones? If not, do you anticipate doing so? We have not submitted any manuscript to journals yet, but we are planning on include some of this information in future publications. Partial data

collected from Nachusa Grasslands was included in both Baena-Bejarano's and Dana's doctoral dissertation (in prep). All publications resulting from our work with Nachusa Grasslands will be attributed appropriately and relayed back to Friends of Nachusa and Elizabeth Bach.

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

We want to sincerely apologize for the difficulty presented mainly in 2019 and partially in 2018 from our Sponsored Programs Administration. It was not made clear to either us or our staff at the Illinois Natural History Survey in advance what the process was, but now it will be much smoother in the future for all Illinois Natural History Survey researchers (staff and graduate students alike) that might choose to apply for a grant with Friends of Nachusa Grasslands.