

**The Friends of Nachusa Grasslands  
2019 Scientific Research Project Grant Report  
Due April 30, 2020**

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**2019 grant amount:** \$4,271

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

**Research Project Topic:** Song analysis of dog-day cicadas to identify potential hybrids

**Research Project Purpose:** To document through audio recordings the calls of male cicadas at Nachusa Grasslands. Three species of closely related dog-day cicadas are uniquely found to overlap at Nachusa Grasslands and my goal was to observe if these species segregated their calls temporally or by modifying the frequency (kHz).

**Research Project Outcomes to date:**

High-quality recordings of the male choruses of four species of cicadas within Nachusa Grasslands have been isolated. While *Neotibicen pruinosus* was observed to primarily call in the early evening, we are still determining if there is a statistical difference between the calling times of *N. canicularis* and *N. linnei*. Several recordings from outside of Nachusa Grasslands have also been taken, but audio analysis needs to be completed and recordings filtered. This summer we will continue recordings of these species to add to the dataset.

**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:**

Three audio recorders from Wildlife Acoustics were purchased (\$2592.94) – two were placed at Nachusa Grasslands for the majority of last summer and the third was placed at several locations throughout the state to record the same set of species. Four trips (multi-day) from Champaign-Urbana were made to search for cicada nymphs, change batteries in recorders, and take down the recorders (\$708.44). I also purchased a student license for audio analysis software from Cornell Labs, RAVEN (\$100). The remaining funds were spent on supplies, like batteries for recorders, SD cards, collecting vials, labelling supplies, and other consumables.

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

Cicadas are a large and important food source for many animals, from other arthropods like spiders, wasps, and praying mantises to insectivorous birds to small mammals (below-ground) to snakes. I recently collaborated on a project where an emergence of periodical cicadas was correlated with an increase in fecundity of copperhead snakes even during a period of sustained drought (<https://doi.org/10.1038/s41598-019-51810-9>). There are many species of animals that likely use cicadas as a major food source and this is just one of the reasons that their conservation is so important.

I plan to use the audio recordings of cicadas from last summer in public outreach/scientific talks and other media (Twitter: @ONoKatyDidnt) to promote public appreciation of cicadas. I am happy to share these recordings with the Friends as well. The sounds of summer can often be ignored or taken for granted and I hope that residents and visitors to the Nachusa Grasslands area appreciate the unique soundtrack of cicadas that they get to hear.

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

Cicadas are very sensitive to ground disturbance; tilling will kill nymphs and can be used as a control method for periodical cicadas. While we were unable to find any periodical cicada nymphs at Nachusa Grasslands, we did find a nymph of the dog-day cicada *Megatibicen auletes* (the Northern Dusk Singing Cicada) underneath an oak tree. It was approximately five inches from the soil surface. At other locations in Illinois we were able to find periodical cicada nymphs in the soil, and similarly, they were also located within the top six inches of the surface. This is one of the reasons that many rare species of cicadas can only be found in areas of low soil disturbance (even in seemingly low floristic quality areas) like roadside, railroad, and cemetery prairies. However, I have found that some species of cicadas (e.g. *Cicadettana calliope calliope* at Loda Cemetery Prairie NP) are able to move into restorations. Cicadas spend many years underground (likely more than three for all Illinois species) so change can be slow but also disturbances can have long-term effects on populations.

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

Dana, C.E and S.W. Heads. 2019. The Soundscape of Nachusa Grasslands: Observations of Regional Variation in Dogday Cicada Choruses. Friends of Nachusa Grasslands Science Symposium. 10/2019. (Poster)

Dana, C.E. 2019. Cicadas of Illinois. Annual Grand Prairie Friends Meeting. Urbana, IL. (Presentation)

**Have you submitted manuscripts to scientific journals? If so, which ones? If not, do you anticipate doing so? (Please send copies of published articles to the Friends so that we can learn from your work.)**

I have not submitted any manuscripts on this research to scientific journals at this time. Part of my research at Nachusa Grasslands will be included in a report on cicada distribution records in Illinois that I anticipate submitting to the INHS Bulletin or a similar journal in the next few months. Part of the research I conducted in this past year and as part of the previous grant will be included in my dissertation, including the extraction of DNA from cicada molts found at Nachusa Grasslands which was then used for barcoding (species determination). This research will also be published, but I will be discussing with my committee the best journal for this. I hope that the information from my song analysis will bear fruit, but at the very least, I plan to use this audio information for future analyses and for public outreach.

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

Our travel is restricted to a minimum at the current time, but we hope as things progress over the future weeks we can place recorders at new locations to gather more calls from the dog-day species of cicadas. Also – in 2024 I plan to do audio surveys in Nachusa Grasslands and surrounding areas to determine the abundance of periodical cicadas and observe any wildlife that might be feeding on them.

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

Thank you for all that you do. It is always a pleasure doing research at Nachusa Grasslands.