**PROJECT TITLE: Engagement and Monitoring for the Insect Apocalypse**

**I. PROJECT STATEMENT**

**This project will document baseline insect biodiversity across the state by deploying passive interception traps, and engaging with budding insect biologists to sort and identify collected material.**

**Need**. Information on the distribution and diversity of most groups of insects is limited, to the point where we are likely losing species before we can document their existence and understand their role in the environment. Although we can speculate about the causes of these declines (climate change, habitat loss, pesticides), the first critical need towards understanding a mechanism for the losses is to broadly document insect diversity.

**Background**.Recent media attention has highlighted scientific reports, suggesting an *insect apocalypse* or *Armageddon* is upon us. Evidence suggests that the sheer numbers of insects are potentially suffering dramatic declines. Insects are major regulators of ecosystem services including pollination of native plants and agricultural crops, soil decomposition, and biological control of pests. Loss of insects is predicted to cause cascading declines in food webs that depend heavily on them as food resources.

The few studies with enough long-term insect data to describe trends through time suggest population declines of 40-75% over the last several decades. The insect species for which we have enough data to detect declines represents a small fraction, likely 1%, of the total diversity. However, our knowledge about the 1% may be insufficient to provide a solid base for management and conservation of the other 99%. The relative lack of long-term datasets is a call to action to improve our understanding of insect abundance and diversity in Minnesota.

**Goal**. We propose to contribute to the global efforts to document insect diversity by establishing a baseline insect biodiversity survey across Minnesota. This sampling will provide opportunities to begin species-level surveys of poorly-known insect groups. This project will engage with citizen-scientists to collect data and with students of insect biology to further the capacity to study insects in Minnesota.

Surveys will employ a network of Malaise traps, standard tent-like nets used to efficiently trap various insect groups, at stratified locations across sites with existing long-term monitoring through the ENRTF project, *Statewide Monitoring Network for Changing Habitats in Minnesota*. Sites will be selected to represent the diversity of Minnesota’s ecosystems. Malaise traps are being globally employed as a means of surveying insect diversity and have been shown to capture upwards of 5,000 insect species. Citizen-scientists have been essential to successful monitoring efforts addressing the issue of insect declines. We propose to engage with citizen-scientists to assist in sample collection. Likewise, we will collaborate with entomologists statewide to pursue student and faculty participation in documenting species-level diversity.

**Outcome**.This project seeks to establish a baseline survey of insect diversity, upon which future monitoring will be founded. We will engage with students and citizens to bring awareness to insect biodiversity.

**II. PROJECT ACTIVITIES AND OUTCOMES**

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| **Activity 1 Title: Establish baseline insect biodiversity assessment in Minnesota**  **Description:** *This work seeks to establish baseline insect surveys to better understand the faunistic diversity and distribution. We will establish a network of Malaise traps at 20 sites across Minnesota. These traps are the standard methodology for broadening our understanding of insect diversity and have been used extensively in published reports documenting insect declines. We will engage with Minnesota citizen-scientists, local to the sites where traps are deployed to collect trap contents. Likewise, we will connect with local colleges and universities to engage young scientists in the pursuit of furthering our understanding of insect diversity in Minnesota and building interest in the field of insect conservation.*  **ENRTF BUDGET: $ 191,824** | |  |
| **Outcome** | **Completion Date** |
| *1. Establish and deploy a network of 20 Malaise traps at 20 sites across Minnesota* | *November, 2021* |
| *2. Engage with Minnesotans to collect, sort, and identify insects* | *June, 2023* |

**III. PROJECT PARTNERS AND COLLABORATORS:**

We will engage with the University of Minnesota Insect Collection staff to coordinate preservation and curation of insect specimens. Likewise, collaborators that teach entomology at the University of Minnesota, St. Olaf College, and Concordia College will engage with students to sort trap contents. Through this collaboration, students will have the opportunity to learn about and document insect diversity in Minnesota.

**IV. LONG-TERM IMPLEMENTATION AND FUNDING:**

This project establishes a baseline upon which future surveys of insect biodiversity will be based. This is the first phase of establishing a long-term monitoring project. By using previously established long-term monitoring sites through the *Statewide Monitoring Network for Changing Habitats* project, we will be able to make inferences about trends across plants and insects through time. This is the initial phase of what will be a long-term monitoring effort with repeated surveys at regular intervals through time. Traps can be re-used, but we will seek additional funding sources to support specimen sorting during future rounds of surveys.

**V. SEE ADDITIONAL PROPOSAL COMPONENTS:**

**A. Proposal Budget Spreadsheet**

**B. Visual Component or Map**

**F. Project Manager Qualifications and Organization Description**