**PROJECT TITLE: Taxonomic Survey of Earthworm Species in Minnesota**

**I. PROJECT STATEMENT**

*Goal: Sample, identify, and document earthworm species in all 87 counties on Minnesota.*

There is a critical need to identify and document earthworm species that are currently found throughout Minnesota. It has been widely established that earthworms were removed from Minnesota, and a large majority of North America, during the Wisconsian Glacier Ice. Both Asian and European earthworms have since been introduced into Minnesota by human activity. Introduced earthworms have caused changes in biodiversity that have led to significant alterations of ecosystem functions. These alterations, such as water and nutrient cycling, have implications on land use, management, restoration, and conservation decisions throughout Minnesota. Earthworm invasive into previously uninhabited areas can have significant ecological consequences. To date, surveys of earthworm distribution in MN have been based on ancillary reports and are incomplete. Our proposed systematic, state-wide field survey will provide a vital list of species and their current distributions throughout the state. This data will help conservation professionals in understanding the current status of earthworm invasions as well as provide a benchmark to track future movement. insight into new/emerging assemblages. This knowledge could also be utilized by state managers and public relations specialist in for public education and creating any relevant awareness and/or action campaigns. Fellow researchers and educational institutions will be able to use this knowledge when studying or addressing current exotic presence, impacts, historical changes, and potential threats.

**II. PROJECT ACTIVITIES AND OUTCOMES**

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| **Activity 1 Title: Earthworm taxonomic survey** **Description:** Within each county 6-10 locations, based on county area, will be surveyed. Sites will be randomly selected within expected hotspots for invasion, including established roads, water access points, wayside stations, and camping facilities. Various ecosystems will be assessed including pasture, meadow, riparian, forested and residential. At each location, 6 sub-sites will be selected for earthworm collection through the environmentally friendly and proven Mustard seed extraction method. Collected specimens will be field preserved, and transported to the lab for accurate identification. Any presence of newly documented species presence will be reported to appropriate agencies (DNR, GLWW). Distribution maps will be created for each taxa and correlations with various environmental factors, such as habitat type and soil characteristics, will be assessed. **ENRTF BUDGET: $233,501** |  |

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| **Outcome** | **Completion Date** |
| 1. Site selection and mapping, refining field methods | September 2020 |
| 2. Field assessment and collection of earthworms in all 87 counties  | October 2021 |
| 3. Identify and document all specimen. Data processing and statistical analysis. | March 2022 |
| 4. Publications, reports, and presentations  | June 2022 |

**III. PROJECT PARTNERS AND COLLABORATORS:**

PI1, Dr. Richard Koch is a Professor of Biology and the Neilson-Cram Endowed Chair of Wetland Ecology at Bemidji State University. Dr Koch has completed multiple ecological studies in wetlands, lakes and uplands throughout northern MN, including multi-year projects funded through the USDA, MNDNR and regional/local foundations.

PI2, L. Dawn Pepper is currently a MS candidate in Biology at BUS, with expected defense of masters’ thesis on soil pH and habitat selection of two earthworm species found in Minnesota in fall 2019. Dawn also brings 15+ years of experience managing all aspects of a library materials budget (>$200,000 annually), a work/study personnel budget (>$145,000), and hiring and supervising student workers (staff>24)**.**

 **LONG-TERM IMPLEMENTATION AND FUNDING:**

PIs will prepare and disseminate information on the project through scientific papers in peer‐reviewed journals. They will also present findings of this project at relevant regional and national meetings. Undergraduate research assistants may use portions of this data for undergraduate research requirements in their programs of studies. Upon completion, portions of this project may be used, to initiate additional undergraduate/graduate studies and establishment of a long-term monitoring program of earthworm movement in MN. No future funding will be necessary for the purposes of this taxonomic survey.

**V. SEE ADDITIONAL PROPOSAL COMPONENTS:**

**A. Proposal Budget Spreadsheet**

**B. Visual Component or Map**

**C. Parcel List Spreadsheet**

**D. Acquisition, Easements, and Restoration Requirements**

**E. Research Addendum (Not required at proposal submission stage. Required later in process, if proposal is recommended. Staff will provide further information at that time)**

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

**G. Letter or Resolution**

**H. Financial Capacity**