Environment and Natural Resources Trust Fund
2020 Request for Proposals (RFP)

Project Title: **ENRTF ID: 038-A**

Taxonomic Survey of Earthworm Species in Minnesota

Category: A. Foundational Natural Resource Data and Information

Sub-Category:

Total Project Budget: $ 233,501

Proposed Project Time Period for the Funding Requested: June 30, 2022 (2 yrs)

Summary:

This proposed 2-year foundational research involves a statewide field survey of earthworm taxa and their distributions throughout Minnesota. Project outcomes include taxa list and distributional maps.

Name: Richard Koch

Sponsoring Organization: Bemidji State University

Job Title: Dr.

Department: College of Business, Math and Science

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Location:

Region: Statewide

County Name: Statewide

City / Township:

Alternate Text for Visual:

County map of Minnesota

_____ Funding Priorities	_____ Multiple Benefits	_____ Outcomes	_____ Knowledge Base
_____ Extent of Impact	_____ Innovation	_____ Scientific/Tech Basis	_____ Urgency
_____ Capacity Readiness	_____ Leverage	_____ TOTAL	_____%

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

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

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.

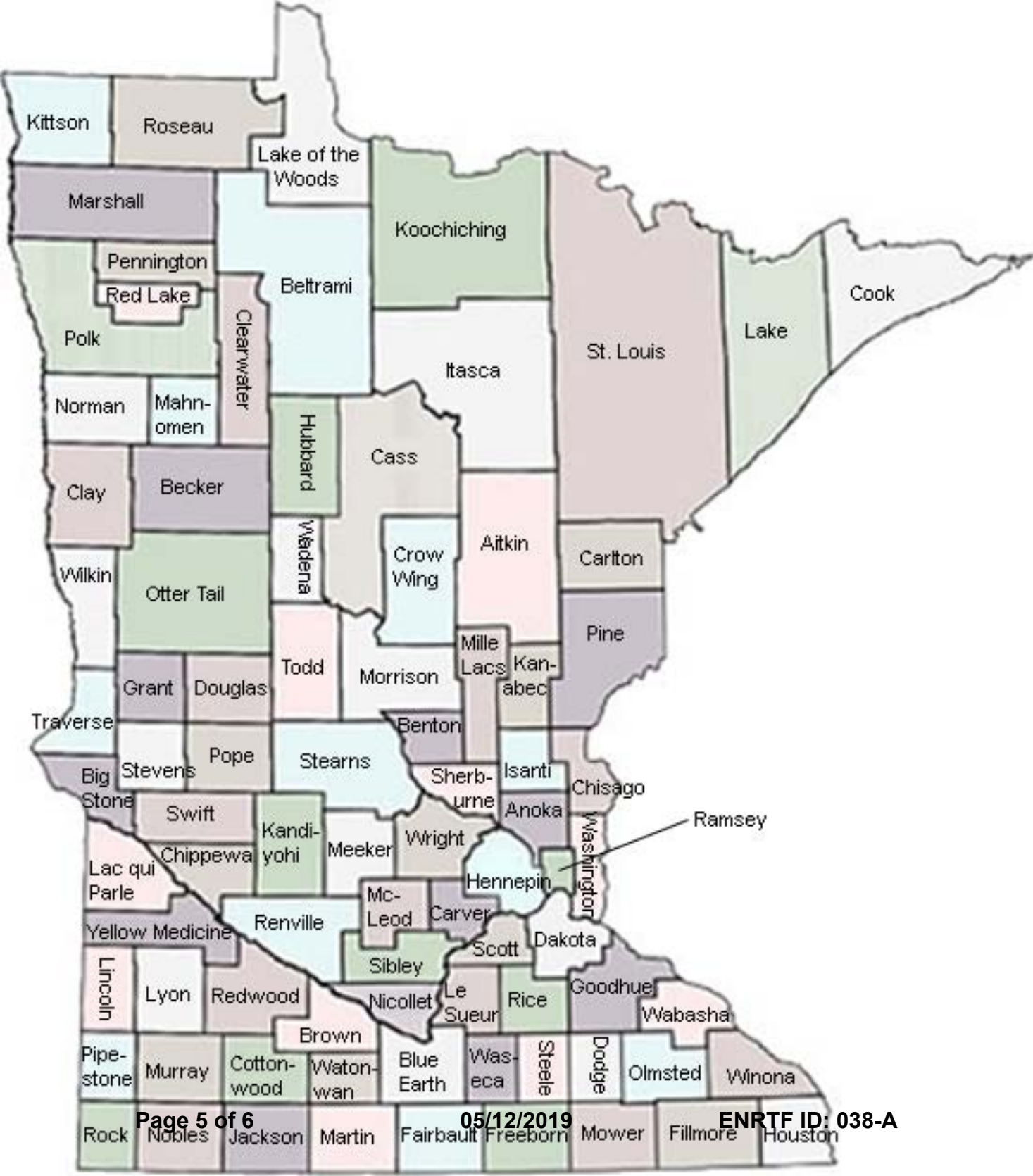
V. SEE ADDITIONAL PROPOSAL COMPONENTS:

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

Attachment A: Project Budget Spreadsheet
Environment and Natural Resources Trust Fund
M.L. 2020 Budget Spreadsheet
Legal Citation:
Project Manager: Dr. Richard Koch
Project Title: Taxonomic survey of earthworm species in Minnesota
Organization: Bemidji State University
Project Budget: $233,501
Project Length and Completion Date: 2yr, completion June 30, 2022
Today's Date: 9 April 2019

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Budget	Amount Spent	Balance
BUDGET ITEM			
Personnel (Wages and Benefits)	$ 199,210	$ -	$ 199,210
PI1, Rick Koch, Bemidji State University. 0.15% FTE. July 2020 -June 2022. Advise PI1, scientific expertise, quality assurance, office and lab space, and assist in information dissemination.($45,000)			
PI2 Dawn Pepper July 2020 -Sept 2021. Collection, ID, document, reporting, hire/oversee assistants, disseminate findings, daily operations. (post grad, 2 yr term $45,000.00/yr + 13% Fringe + 0.077% FICA =79,700)			
Invertebrate specialist, consulant, expert identification, 1 academic semester, .1% FTE Bemidji State ($7500)			
2 students through Bemidji State U. biology program. Collection and Identification. FT (14 wks) (summer 2021), PT 20-21 academic year (32), and 1 student fall 2021 (16 wks). (2720 hrs *$14.00/hr*.077 FICS= $38,080))			
Professional/Technical/Service Contracts			
	$ -	$ -	$ -
Equipment/Tools/Supplies			
sampling bottles, mustard seed, preservation supplies, dissecting tools	$ 1,900		
	$ -	$ -	$ -
Capital Expenditures Over $5,000			
	$ -	$ -	$ -
Fee Title Acquisition			
	$ -	$ -	$ -
Easement Acquisition			
	$ -	$ -	$ -
Professional Services for Acquisition			
	$ -	$ -	$ -
Printing			
ublications in peer-reviewed, open-access journals (2 pubs @ $2,000 each)	$ 4,000	$ -	$ 4,000
Travel expenses in Minnesota			
Fleet mileage: travel to sites, extra-agency meetings (4,100 miles * 0.95/mile)	$ 3,895		
Accomodations: campsite fees, equipment rental (as needed) (PI1, 2 assts)	$ 1,600		
Food during overnight travel (PI1, 2 assts)			
	$ -	$ -	$ -
Other			
Conferenceto present findings, 2 conference, $1,000/conf	$ 2,000		
Hotels and meals, 2 conferences (PI1, PI2)	$ 2,200		
Travel, airfare	$ 1,400		
Indirect costs at 8% of total direct	$ 17,296		
	$ -	$ -	$ -
COLUMN TOTAL	$ 233,501	$ -	$ 203,210

SOURCE AND USE OF OTHER FUNDS CONTRIBUTED TO THE PROJECT	Status (secured or pending)	Budget	Spent	Balance
Non-State:		$ -	$ -	$ -
State:		$ -	$ -	$ -
In kind: Microscopes, storage space, miscellaneous supplies	Secured	$ 9,750	$ -	$ 9,750
Other ENRTF APPROPRIATIONS AWARDED IN THE LAST SIX YEARS	**Amount legally obligated but not yet spent**	**Budget**	**Spent**	**Balance**
M.L. 2016, Chp. 186, Sec. 2, Subd. 03j		$ 225,000	$ 216,500	$ 8,500


Kittson
Roseau
Lake of the Woods
Marshall
Koochiching
Pennington
Red Lake
Beltrami
Polk
Clearwater
Itasca
St. Louis
Lake
Cook
Norman
Mahn-omen
Hubbard
Cass
Clay
Becker
Wadena
Crow Wing
Aitkin
Carlton
Wilkin
Otter Tail
Pine
Mille Lacs
Kan-abec
Todd
Morrison
Grant
Douglas
Traverse
Benton
Pope
Stearns
Stevens
Big Stone
Sherb-urne
Isanti
Chisago
Swift
Anoka
Ramsey
Kandi-yohi
Meeker
Wright
Washington
Chippewa
Lac qui Parle
Hennepin
Mc-Leod
Carver
Renville
Yellow Medicine
Scott
Dakota
Sibley
Lincoln
Lyon
Redwood
Nicollet
Le Sueur
Rice
Goodhue
Wabasha
Brown
Pipe-stone
Murray
Cotton-wood
Watonwan
Blue Earth
Was-eca
Steele
Dodge
Olmsted
Winona
Rock
Nobles
Jackson
Martin
Fairbault
Freeborn
Mower
Fillmore
Houston

Project Manager Qualifications and Organization Description

Bemidji State University (BSU) is a public university in Bemidji, Minnesota. BSU is a part of the Minnesota State Colleges and Universities (MinnState) system. Approximately 5,100 undergraduates and 300 graduate students are currently enrolled at BSU. BSU provides high quality, accessible, affordable higher education to northwestern Minnesota.

Primary investigator 1, Dr. Richard Koch, received his PhD from University of Louisville in 2001 and has been a faculty member at BSU since 2002. Dr. Koch specializes in ecology, wetland ecology, aquatic plants and invertebrates. Dr. Koch is also the Neilson-Cram Endowed Chair of Wetland Ecology and is currently concluding year 3 of a 3-year longitudinal survey of water quality and plankton of Bad Medicine Lake, MN. During this proposed taxonomic earthworm survey, Dr. Koch will be responsible for providing scientific expertise, mentorship of PI2, advise on managing a multi-year project, quality assurance, office and lab space, proofing of reporting documents, writing collaboratively with P2, and assist in information dissemination.

Primary investigator 2, Lisa Dawn “Dawn” Pepper, holds a BS in biology, and will defend her masters’ thesis on soil pH and habitat selection of two earthworm species found in Minnesota at BSU in the fall of 2019. During graduate school Dawn focused on earthworm ecology, physiology, and behavior. Further, Dawn brings 20+ years of experience as a library professional. She has 15+ years of experience managing all aspects of a library materials budget (>$200,000/yr), a work/study personnel budget (>$145,000/yr), and hiring and supervising student workers (staff>24). During this proposed project, Dawn will be responsible for collection, identification, documentations, and statistical analysis of data. Dawn will also be responsible for the daily operations and needs of the survey. She will be providing timely and sufficient reporting, monitoring budget, writing collaboratively with P1, and disseminate findings. Dawn will also hire, train, and supervise the 2 student research assistants.

The student researchers (advance undergraduate or graduate) will assist with sampling, preservation, identification, documentation, and other tasks as directed. The invertebrate specialist will be an academic professional who can advise on difficult identifications and can help put novel findings into context.