Environment and Natural Resources Trust Fund
2014 Request for Proposals (RFP)

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Project Title:

Evaluating Clean Water Legacy: Has the Water Improved?

Category: A. Foundational Natural Resource Data and Information

Total Project Budget: $ 388,500

Proposed Project Time Period for the Funding Requested: 3 Years, July 2014 - June 2017

Other Non-State Funds: $ 0

Summary:

Mining existing and building new foundational data to determine whether Legacy funding is improving water resources and developing restoration BMP effectiveness protocols for WRAPS

Name: Bruce Wilson

Sponsoring Organization: U of MN

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Web Address

Location

Region: Statewide

County Name: Statewide

City / Township:

MP: 0613-2-113-proposa
Budget: 0613-2-113-bud
Qual: 0613-2-113-qualifi
Map: 0613-2-113-map-E
Resolution:
List:

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

PROJECT TITLE: Evaluating Clean Water Legacy: Has the Water Improved?

I. PROJECT STATEMENT

Implementation funding for MN clean water projects has occurred over several decades; but more recently with the creation of the Clean Water Land & Legacy Amendment, larger amounts of state funding have been passed to local units of government (LUGs). These LUGs (i.e., watershed districts and soil and water conservation districts) have never been busier trying to move impaired waterbodies above the MN water quality standard for a given pollutant. There are some clear examples, related to bacteria or wastewater treatment plants, where the water has improved (i.e., MN River low-flow phosphorus and dissolved oxygen). Nevertheless, in 2013 some pressing questions have surfaced from decision makers: are we spending Legacy funds wisely? Is the major watershed approach working? Or my lake watershed has received thousands of dollars from the Board of Water and Soil Resources (BWSR) and the Federal government, yet the lake water quality has not changed in 5 years – WHY? This proposal is about building foundational natural resources (primarily water) data understanding to meet the objectives of the federal Clean Water Act by removing impaired waters from the Section 303(d) list.

The overall goal of this project seeks to address the "WHY" presented above. We will examine data collected over the past several decades by federal, state and local units of government and "mine" it for signs and indicators of water quality change. We will attempt to define issues of "Lag-Time" and "Recovery Potential". Other than the US Geological Survey (USGS), state agencies and LUGs have not extensively examined their data across disciplines (physical, chemical, biological, social and economic) and scales (major watershed down to a stream reach or within a lake) to determine pathways and processes of change. An illustration of the diversity of data collected for watersheds is shown in the attached visual aid. We will examine the newly created Watershed Restoration And Protection Strategies (WRAPS) section in statute HF 1122 and suggest how to better conduct "Best Management Practice (BMP) Effectiveness Assessment" to better answer the "WHY" question and guide future water decision makers.

This project will achieve the stated goals by forming a team of U of MN experts who, in concert with federal and state agencies, will come together as a technical advisory group to provide information to the Clean Water Council, agency commissioners, legislators and LCCMR. Team members will lead core tasks related to statistical analysis and synthesis, and develop "road sign" indicators and restoration protocols that will track water quality responses to BMPs across time and varying geographic and climatic conditions. This proposal is for the most intensive core activities, including those of data mining and developing methodologies for statistically sound monitoring designs. These activities by themselves are needed to ensure wise use of Clean Water Land and Legacy Funds.

II. DESCRIPTION OF PROJECT ACTIVITIES

Activity 1: Data Mining. Conduct statistical analysis (data mining) of existing federal, state, and local data related to water quality and provide a synthesis of our collective understanding by December 31st, 2015. Year-to-year variability in weather and different lag times for water quality responses require extra care in developing tools for statistical analysis. The U of MN team will explore the usefulness of traditional tools as well as recent advances in data mining.

Budget: $100,000

Outcome: New Insight	**Completion Date**
1. Form a team of experts from the U of MN, USGS, state agencies, and selected LUGs.	*9/01/2014*
2. Identify data sources and define the analysis and synthesis to be used.	*12/31/2014*

3. Conduct analysis and synthesis and report outcomes to decision makers.	*12/31/2015*

Activity 2: Develop "road signs". From Activity 1, design and develop "road sign" indicators and markers to link incremental progress associated with selected BMPs and water quality response. Road sign indicators are needed because many of the traditional indicators of water quality require several years of flows before the pre-treatment contaminants are "flushed" from the watershed system.

Budget: $207,500

Outcome: New Tools	**Completion Date**
1. Based on relationships defined above, construct nutrient and sediment tracking tools.	*12/31/16*
2. Integrate physical and chemical data with biological indicators across spatial scales.	*12/31/16*
3. Compile biophysical indicators into a socio-economic communication tool.	*12/31/16*

Activity 3: Publish a restoration protocol. Communicate project results and publish a "Restoration" BMP Effectiveness Protocol for WRAPS. We will hold multiple meetings with stakeholders and communicate the nature of water quality response to land use management. We will work with MPCA and DNR to further refine the WRAPS process.

Budget: $81,000

Outcome: Better Water Quality Communication	**Completion Date**
1. Present results to state, local officials, and LCCMR and revise as needed.	*12/31/16*
2. Prepare a final document for the restoration portion of WRAPS.	*6/30/17*

III. PROJECT STRATEGY

A. *Project Team/Partners:*

The University of Minnesota will serve as the fiscal agent and coordinator of the technical advisory team. Faculty and their associated roles are as follows: Bruce Wilson (Professor & Lead-PI) will oversee Activity 1 (no request for ENRTF funding), Chris Lenhart (Research Professor & Co-PI) will lead and direct Activity 2 (0.2 FTE ENRTF funding), and Joe Magner (Research Professor & Co-PI) will work with the above activities and lead Activity 3 (0.2 FTE ENRTF) in cooperation with Co-PIs and collaborators. John Nieber (Professor) will also be a member of the project team and will provide advice on all three activities. ENRTF will be required to fund 2 graduate students, 1 technician, purchase supplies, and allow for travel. Other collaborators will include USGS, MN Department of Agriculture, MPCA, BWSR, DNR, Soil and Water Conservation Districts and Watershed Districts, MN Corn Growers, The Nature Conservancy. These partners will cooperate with no cost to the project.

B. Timeline Requirements

3 years are required for this project, allowing for 2 ½ years of data collection, analysis, and synthesis; the last ½ year will be focused on communication.

C. Long-Term Strategy and Future Funding Needs

Three years of funding from ENTRF will begin the effort of better understanding the relationship between BMP effort and water quality response; however, additional ENRTF funds will be sought to develop sentinel watersheds. Sentinel status implies an around-the-clock watch over a lengthy period of time. This level of scrutiny cannot be applied everywhere in Minnesota; yet it must be applied to a few well-defined locations to respond to future legislative and LCCMR inquiries. WRAPS will be funded by the Clean Water Land and Legacy Program.

2014 Detailed Project Budget

Project Title: Evaluating Clean Water Legacy: Has the Water Improved?

IV. TOTAL ENRTF REQUEST BUDGET: 3 years

BUDGET ITEM *(See "Guidance on Allowable Expenses", p. 13)*	**AMOUNT**	
Personnel:		
Bruce Wilson: Project Manager		
Joe Magner: Research Professor, 20% Time (3 y), 74% Salary, 26% Benefits	$ 75,000	
Chris Lenhart: Research Professor, 22% Time (3 y), 74% Salary, 26% Benefits	$ 75,000	
Graduate research assistants - @2 FTE for 2 years, 56% Salary, 44% Benefits	$ 169,400	
Research fellow: 10% Time (1 y), 74% Salary, 26% Benefits	$ 9,500	
Undergraduate research assistants: Hourly appointment ($12/h)	$ 11,150	
Scientist: 24% Time (2 y), 74% Salary, 26% Benefits	$ 40,000	
Contracts:	$	-
Equipment/Tools/Supplies: Printing charges, electronic storage devices	$	1,950
Acquisition	$	-
Travel: In-state travel to work with partners and visit watersheds	$	6,500
Additional Budget Items:	$	-
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND $ REQUEST =	$	388,500

V. OTHER FUNDS

SOURCE OF FUNDS	**AMOUNT**	**Status**
Other Non-State $ Applied to Project During Project Period:	$ -	
Other State $ Being Applied to Project During Project Period:	$ -	
In-kind Services During Project Period:	$ -	
Project Manager (Bruce Wilson) Salary: 1%	$4,850	*Secure*
University of Minnesota IDC - 52%	$202,020	*Secure*
Remaining $ from Current ENRTF Appropriation (if applicable):	$ -	
Funding History:	$ -	

Visual Aid

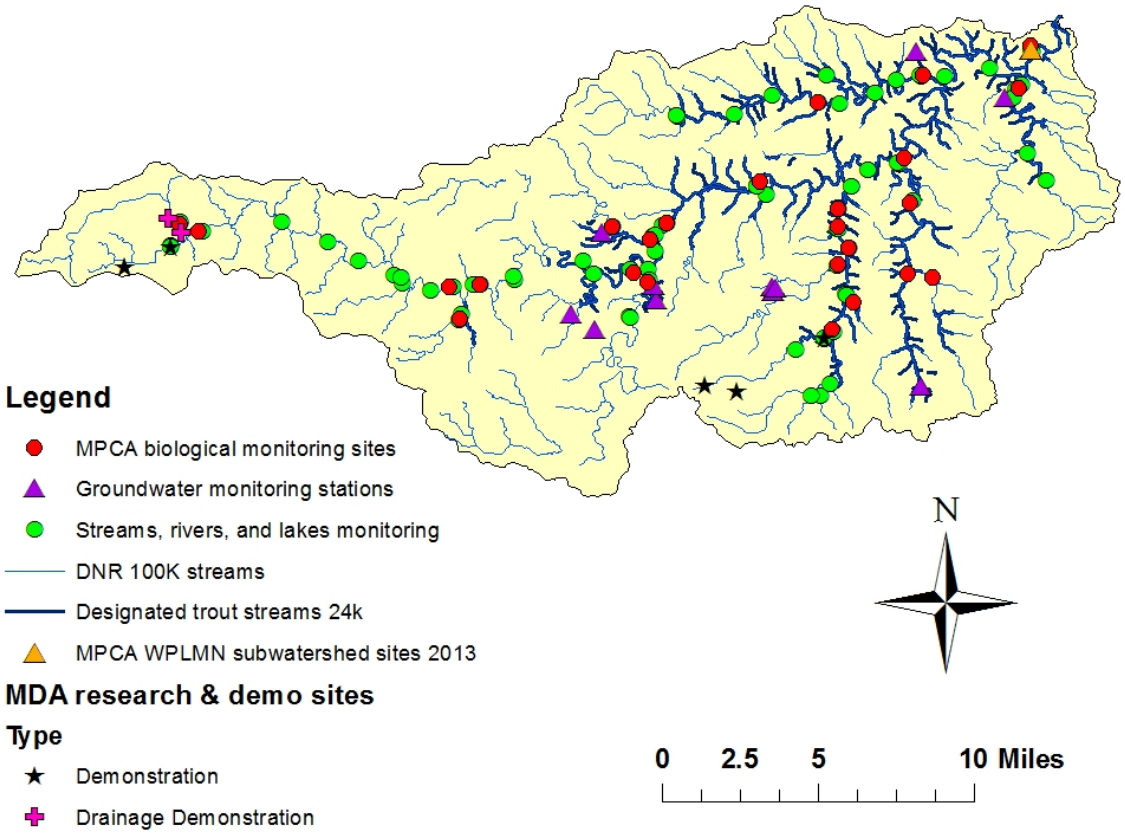

Illustration of the Diversity of Data Collected for Watersheds Using South Branch of the Root River in Southeastern Minnesota. Data collected include sampling sites for biological health, groundwater monitoring, surface water monitoring, as well as field-scale data from research and demonstration sites. Also shown is a sampling site that is part of the MPCA Watershed Pollutant Load Monitoring Network.

Bruce N. Wilson
Department of Bioproducts and Biosystems Engineering
College of Food, Agriculture and Natural Resources Sciences
University of Minnesota

Key Qualifications

Bruce Wilson is a Professor in the Department of Bioproducts and Biosystems Engineering at the University of Minnesota and is a Center-for-Transportation-Studies Scholar. He was a member of the faculty at Oklahoma State University for eight years and has been a member of the faculty at the University of Minnesota since 1991. Dr. Wilson has extensive modeling and experimental background in erosion mechanics and in hydrologic/water quality processes of watersheds resulting in many technical publications. Five of these publications have received recognition for meritorious research. His hydrologic and sedimentologic model for surface mined lands has been widely used in the design of sediment control plans, and his animal feedlot model is an extensively used management tool. He has served as a lead or co-investigator on more than forty research projects. With the assistance of Minnesota Department of Transportation, Dr. Wilson established an erosion certification program for construction sites in Minnesota. Since 2002, the program has taught more than 20,000 attendees. It has a full-time director with annual budget of nearly $200,000. Dr. Wilson has been an advisor for more than 31 graduate students, and he has been a member of graduate committees of an additional 100 students. He teaches courses in the watershed management, hydrologic modeling and statistical analysis and the recipient of several teaching awards. He is a registered Professional Engineer and is a Fellow of the American Society of Agricultural and Biological Engineers.

Education

Ph.D University of Kentucky, Agricultural Engineering (1984)
M.Sc. University of Minnesota, Agricultural Engineering (1979)
B.Sc University of Minnesota, Agricultural Engineering (1976)

Professional Experience

1983-1991: Assistant and Associate Professor, Agricultural Engineering Department
Oklahoma State University
1991- present: Assistant, Associate and Full Professor, Biosystems & Agricultural Engineering
University of Minnesota

Selected Honors and Awards

- Honorable Mention Technical Paper Award by the American Society of Agricultural Engineering (1991, 2005).
- Outstanding Technical Reviewer for the American Society of Agricultural Engineering (1990, 1991, 1994, 2002)
- Distinguished Graduate Teaching Faculty Award, College of Food, Agricultural and Natural Resource Sciences, University of Minnesota (2010).
- Distinguished Undergraduate Teaching Faculty Award, College of Food, Agricultural and Natural Resource Sciences, University of Minnesota (2013).