



Environment and Natural Resources Trust Fund

2027 Request for Proposal

General Information

Proposal ID: 2027-567

Proposal Title: Dashboard and Economic Analysis for Nutrient Reduction Goals

Project Manager Information

Name: Nicholas Gallagher

Organization: U of MN - College of Food, Agricultural and Natural Resource Sciences

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Project Basic Information

Project Summary: Development of a decision-support dashboard and empirical evaluation of on-farm conservation practices to facilitate watershed-specific identification of cost-effective approaches for reducing non-point source nitrogen and phosphorus runoff from Minnesota agriculture.

ENRTF Funds Requested: \$621,000

Proposed Project Completion: June 30, 2030

LCCMR Funding Category: Water (B)

Project Location

What is the best scale for describing where your work will take place?

Statewide

What is the best scale to describe the area impacted by your work?

Statewide

When will the work impact occur?

During the Project and In the Future

Narrative

Describe the opportunity or problem your proposal seeks to address. Include any relevant background information.

Minnesota waters remain threatened by long-term nutrient runoff, with a majority coming from nitrogen (N) and phosphorus (P) applied to cropland. These non-point sources are especially difficult to manage, because nutrient losses vary substantially across landscapes, cropping systems, and weather conditions.

To meet water quality standards, the 2025 Minnesota Nutrient Reduction Strategy (NRS) sets nutrient reduction goals that require large-scale investments in best management practices (BMPs) across the landscape, with costs shared between public programs and private landowners. The NP-BMP tool, built for the 2014 NRS, was developed to find cost-effective combinations of BMPs specific to each watershed. The 2025 NRS estimates the overall cost of meeting nutrient reduction goals with the most cost-effective combination of BMPs will be at least \$1 billion annually.

As private landowners consider BMPs on their own land, a key challenge is designing and implementing programs that result in cost-effective BMP adoption. The NP-BMP tool was designed to support program effectiveness, but it was created in a spreadsheet format, limiting its accessibility and use. Additionally, various program designs have been implemented in Minnesota to meet nutrient reduction goals, generating extensive data on spending and outcomes and necessitating systematic economic analysis and evaluation of their effectiveness.

What is your proposed solution to the problem or opportunity discussed above? Introduce us to the work you are seeking funding to do. You will be asked to expand on this proposed solution in Activities & Milestones.

This project will support cost-effective fulfillment of nutrient reduction goals, through user-friendly decision tools, education and training, and economic analysis of program data. In coordination with the Minnesota Pollution Control Agency, we will create a new web-based user-friendly dashboard version of the NP-BMP tool, enabling policy planners and implementers to compare cost-effective N and P runoff reduction strategies. The data underlying the tool will be updated with the most recent information on practice costs and effectiveness.

Extension-led outreach and training will support statewide use of the tool and gather stakeholder input to guide refinement. Meanwhile, the data and analytical framework underlying the NP-BMP dashboard will be enhanced to evaluate outcomes across different weather scenarios, connect watershed actions to downstream effects, and test policy scenarios linked to conservation adoption. Through user input, an enhanced version of the tool will be generated later in the project period.

Finally, the project will conduct empirical analyses linking simulated outcomes, monitoring data, and conservation payment data to assess the effectiveness of conservation programs including NRCS CSP and EQIP, One Watershed, One Plan, and the MAWQCP. These findings can help improve future program design and best practices for using NP-BMP dashboard.

What are the specific project outcomes as they relate to the public purpose of protection, conservation, preservation, and enhancement of the state's natural resources?

This project supports protection and enhancement of Minnesota waters by enabling agencies and watershed planners to develop targeted nutrient reduction plans. Outcomes include a spatially-explicit framework for identifying cost-effective nutrient reduction strategies, updated datasets on BMP effectiveness and costs, a web-based decision-support platform for testing BMP adoption, expanded scenario functionality for weather and policy analysis, improvement of the platform's underlying model, empirical evidence of the effectiveness of major conservation programs, and training for Minnesota's conservation workforce. These outputs will facilitate conservation targeting, strengthen water quality planning, and support efficient use of public funds to reduce nutrient runoff in Minnesota waters.

Activities and Milestones

Activity 1: Build a Web-Based Decision-Support Dashboard for Planning Nitrogen and Phosphorus Load Reduction in Minnesota Watersheds

Activity Budget: \$124,754

Activity Description:

Preliminary updates of the NP-BMP tool will begin in 2026 using federal funding that is not included in this LCCMR budget. This activity will extend those funds to update the foundational data and develop a modernized web-based dashboard for the NP-BMP tool.

The foundational data will be updated in three dimensions. First, we will modernize the estimated nutrient removal effectiveness of BMPs with updated evidence from field measurements and the EPIC and DSSAT simulation models. Much of this modeling work has been done and just needs to be adapted to fit the NP-BMP tool. Second, we will update estimated changes to yields and revenues from changes in practice adoption. Third, we will update cost estimates for conservation practices. The cost data will be compiled from payment data from federal and state conservation programs and farm-level financial data collected by the Center for Farm Financial Management at UMN.

The NP-BMP tool will be developed as a web-based dashboard to replace the existing spreadsheet-based tool. This effort will include developing a user-friendly web interface, incorporating the database with the updated data, and integrating a least-cost analysis feature to help stakeholders identify the most cost-effective conservation strategies for each watershed in Minnesota.

Activity Milestones:

Description	Approximate Completion Date
Update reduction estimates, adoption costs, and revenue changes from conservation practices.	January 31, 2028
Use data to incorporate real-world variation in BMP and program effectiveness across watersheds.	September 30, 2028
Build a web-based dashboard providing decision support to watershed planners in Minnesota.	December 31, 2028

Activity 2: Extension and Outreach for Decision Makers

Activity Budget: \$119,676

Activity Description:

This activity will engage stakeholders involved in the Minnesota NRS to facilitate the adoption of the newly built decision-support dashboard tool and gather input for further enhancements of the tool. The first part of this work will focus on comprehensive Extension education, including online and in-person training sessions and tool demonstrations. This effort provides workforce training for Minnesota’s conservation planners. We will also develop a suite of educational resources, including written materials, webinars, and presentations, to highlight the patterns and insights derived from tool outputs at watershed, basin, and statewide scales. We will work with MPCA, the NRS Advisory Team, and BWSR to connect with local watershed groups to organize sessions and disseminate resources.

The second part will be forward-looking, leveraging the workshops to obtain feedback from potential user groups on an enhanced version of the tool. In these structured discussion sessions, participants will identify new functionalities to aid conservation decision-making at highly local scales. We will also assess the need for additional features and functionalities by utilizing the data and research from Activities 3 and 4, discussed below. This analysis will be used to inform Activity 3.

Activity Milestones:

Description	Approximate Completion Date
Develop education resources to support tool use including online demonstrations.	January 31, 2028
Conduct in person training sessions for NP-BMP tools.	March 31, 2028
Solicit feedback on NP-BMP tool functionality.	March 31, 2028
Develop working plan to extend NP-BMP tool functionality to meet needs of the user base.	December 31, 2028

Activity 3: Expanding Data and Tool Functionality

Activity Budget: \$230,837

Activity Description:

This activity will expand the functionality of the NP-BMP dashboard by collecting additional data and adding options for running scenarios and testing policies. The primary functions that will be added are nutrient loading estimates for ranges of weather scenarios, watershed level changes connected to downstream effects, and adoption rates of conservation programs. These features will support increased comprehensiveness of policy analysis and support local stakeholder groups with evidence-based findings to help target funding opportunities.

Several data sources will be targeted including loading estimates for various weather scenarios, Watershed Pollutant Load Monitoring Network and 24-hour Nitrate Network data, and conservation program data. No individual farmer data will be used at any point. We will focus on watershed planning approaches to develop nutrient reduction strategies.

We will also use the findings from feedback solicited in Activity 2 to ensure the tool is accessible and serves the needs of watershed planners. This process will be a continuous feedback loop where we push updates to the live dashboard and accept feedback from users. This simplified updating procedure will ensure the tool stays current into the future to help meet the 2040 NRS deadline as well as servicing watershed planning beyond this target date.

Activity Milestones:

Description	Approximate Completion Date
Aggregate data on nutrient loads in MN surface waters and conservation program participation.	December 31, 2028
Incorporate additional data and feedback on usability into dashboard.	January 31, 2030
Expand the functionality of the online dashboard tool for running scenarios and testing policies.	June 30, 2030

Activity 4: Empirical Analysis of Conservation Programs

Activity Budget: \$145,733

Activity Description:

This activity will perform empirical analyses to assess historical effects of state and federal conservation programs on nutrient pollution. We will perform a regression analysis of real-time nutrient loads on current practice implementation at the watershed level controlling for rainfall and watershed specific characteristics. We will use this analysis to improve the prediction of effects of practice adoption produced by the NP-BMP dashboard by comparing marginal abatement values in the dashboard to the estimated causal effects from the regression analysis.

We will also use regression analysis to assess how changes in conservation program outlays relate to total practice adoption and nutrient loading. This will allow us to assess the effectiveness of specific programs including NRCS CSP and EQIP and the Minnesota Agricultural Water Quality Certification Program. These analyses will inform future program iterations as well as best practices for utilizing the NP-BMP tool.

Finally, we will conduct an analysis of One Watershed, One Plan. The watershed specific comprehensive plans have been implemented gradually across the state providing a unique opportunity to conduct a difference in difference regression analysis where we can assess how comprehensive watershed plans influence conservation program participation, conservation practice adoption, and overall improvements in nutrient loading mitigation.

Activity Milestones:

Description	Approximate Completion Date
Connect field level simulated data to fitted estimates of nutrient loading abatement.	January 31, 2029
Conduct regression analysis of watershed BMP adoption on downstream nutrient loads.	June 30, 2029
Conduct regression analysis of conservation program participation on downstream nutrient loads.	January 31, 2030
Conduct difference in difference analysis of One Watershed, One Plan.	June 30, 2030

Dissemination

Describe your plans for dissemination, presentation, documentation, or sharing of data, results, samples, physical collections, and other products and how they will follow ENRTF Acknowledgement Requirements and Guidelines.

Dissemination efforts center around the development and promotion of the NP-BMP website. This website will contain the dashboard and documentation for the tool as well as resources to guide the dashboard use. These efforts are initiated as part of Activity 2 and continued through the life of the project. The dissemination efforts will help ensure the accessibility and usability of the dashboard by guiding its use and by gathering feedback to inform updates.

Long-Term Implementation and Funding

Describe how the results will be implemented and how any ongoing effort will be funded. If not already addressed as part of the project, how will findings, results, and products developed be implemented after project completion? If additional work is needed, how will this work be funded?

An accessible website will be developed as part of the project to include the NP-BMP decision-support dashboard (Activity 1), documentation on the model and data (Activity 1), and resources for guiding dashboard use (Activity 2). The website will be hosted by the University of Minnesota and maintained by the Department of Applied Economics. Within the project timeline, the dashboard and associated materials will be updated to ensure long-term functionality and usefulness (Activity 3), and a simplified updating procedure will ensure future updates can be made efficiently (Activity 3) by the Department of Applied Economics in collaboration with Extension.

Project Manager and Organization Qualifications

Project Manager Name: Nicholas Gallagher

Job Title: Assistant Professor

Provide description of the project manager's qualifications to manage the proposed project.

Nicholas Gallagher is an Assistant Professor in the Department of Applied Economics. His research centers on incorporating environmental information into economic models to study farm operations, risk management, and agricultural policy. He has helped produce a web-based tool to support farmers in alfalfa harvest decisions, and he has developed a model of cropland allocation and nitrogen use to analyze conservation support programs.

Organization: U of MN - College of Food, Agricultural and Natural Resource Sciences

Organization Description:

The College of Food, Agricultural and Natural Resource Sciences (CFANS) at the University of Minnesota Twin Cities is a college focused on food, agriculture, and natural resources, offering 14 majors, 3 pre-majors, and 26 minors, with a strong emphasis on hands-on learning and real-world experience. Major focuses of CFANS research and education include feeding a growing population, protecting wildlife, building sustainable communities, and improving human and animal health.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
Personnel								
Nicholas Gallagher		PI: Manage project, support extension of NP-BMP tool, advise RA, and conduct empirical analysis.			36.6%	0.99		\$54,610
Jeffrey Peterson		Co-PI: Support the NP-BMP tool update and lead the outreach and extension initiatives.			36.6%	0.99		\$81,931
Senior Researcher		Lead the NP-BMP tool update and extension work. Support outreach initiatives.			36.6%	1.5		\$223,965
David Mulla		Provide new simulation data for updated tool and additional modeling for tools extension.			36.6%	0.12		\$11,005
Researcher 6		Conduct simulation modeling for extended tool functionality.			36.6%	0.15		\$21,906
Researcher 5		Support database development and management for web-based tool			36.6%	0.15		\$15,221
Research Assistant		Support economic data collection, data integration for web-based tool, and empirical analysis.			24.2%	1.5		\$205,942
							Sub Total	\$614,580
Contracts and Services								
							Sub Total	-
Equipment, Tools, and Supplies								
							Sub Total	-
Capital Equipment								
							Sub Total	-
Acquisitions and Stewardship								
							Sub Total	-
Travel In Minnesota								

	Miles/ Meals/ Lodging	3	To attend stakeholder feedback meetings					\$2,145
							Sub Total	\$2,145
Travel Outside Minnesota								
							Sub Total	-
Printing and Publication								
	Publication	Two scientific publications	Open access fee					\$4,275
							Sub Total	\$4,275
Other Expenses								
							Sub Total	-
							Grand Total	\$621,000

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
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Non ENRTF Funds

Category	Specific Source	Use	Status	Amount
State				
			State Sub Total	-
Non-State				
			Non State Sub Total	-
			Funds Total	-

Total Project Cost: \$621,000

This amount accurately reflects total project cost?

Yes

Attachments

Required Attachments

Visual Component

File: [9870b66f-ce7.pdf](#)

Alternate Text for Visual Component

This is a snapshot of current NP-BMP spreadsheet tool....

Supplemental Attachments

Capital Project Questionnaire, Budget Supplements, Support Letter, Photos, Media, Other

Title	File
Board of Regents Approval	b32386e6-168.pdf
Support Letter from Minnesota Pollution Control Agency	0e9660ec-a14.pdf

Administrative Use

Does your project include restoration or acquisition of land rights?

No

Do you understand that travel expenses are only approved if they follow the "Commissioner's Plan" promulgated by the Commissioner of Management of Budget or, for University of Minnesota projects, the University of Minnesota plan?

Yes, I understand the UMN Policy on travel applies.

Does your project have potential for royalties, copyrights, patents, sale of products and assets, or revenue generation?

No

Do you understand and acknowledge IP and revenue-return and sharing requirements in 116P.10?

N/A

Do you wish to request reinvestment of any revenues into your project instead of returning revenue to the ENRTF?

N/A

Does your project include original, hypothesis-driven research?

Yes

Does the organization have a fiscal agent for this project?

No

Does your project include the pre-design, design, construction, or renovation of a building, trail, campground, or other fixed capital asset costing \$10,000 or more or large-scale stream or wetland restoration?

No

Do you propose using an appropriation from the Environment and Natural Resources Trust Fund to conduct a project that provides children's services (as defined in Minnesota Statutes section 299C.61 Subd.7 as "the provision of care, treatment, education, training, instruction, or recreation to children")?

No

Provide the name(s) and organization(s) of additional individuals assisting in the completion of this proposal:

Jeffrey Peterson, David Mulla, Missy Sullivan

Do you understand that a named service contract does not constitute a funder-designated subrecipient or approval of a sole-source contract? In other words, a service contract entity is only approved if it has been selected according to the contracting rules identified in state law and policy for organizations that receive ENRTF funds through direct appropriations, or in the DNR's reimbursement manual for non-state organizations. These rules may include competitive bidding and prevailing wage requirements

N/A