Environment and Natural Resources Trust Fund

2026 Request for Proposal

General Information

Proposal ID: 2026-349

Proposal Title: Restoring Floodplains for Nitrate Removal and Habitat Expansion

Project Manager Information

Name: Beth Fisher

Organization: Minnesota State Colleges and Universities - Minnesota State University Mankato

Office Telephone: (507) 389-2762

Email: beth.fisher@mnsu.edu

Project Basic Information

Project Summary: Watershed Management Organizations along the Minnesota River aim to reduce nutrient loads and hydrologic impacts. This project prioritizes floodplain restoration sites to decrease nutrient pollution and enhance ecosystem function.

ENRTF Funds Requested: $533,000

Proposed Project Completion: July 31, 2028

LCCMR Funding Category: Water (B)

Project Location

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

Region(s): Central

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

Region(s): Central

When will the work impact occur?

In the Future

Narrative

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

Across Minnesota, the One Watershed, One Plan (1W1P) program has helped develop comprehensive strategies for sustainable water management. While each 1W1P along the Minnesota River used different terminology, all identified nutrient and sediment loads, altered hydrology, and, in many cases, habitat loss as key concerns. Addressing these challenges requires a range of solutions, but floodplain restoration stands out as a holistic approach that tackles multiple issues simultaneously.

For floodplain restoration to be effective, site-level prioritization is essential. While many 1W1Ps highlight key subwatersheds for restoration, they often lack parcel-level site evaluation. Without this level of detail, projects may be less effective, driving up costs to achieve program goals. However, identifying the most impactful sites is challenging without the right tools to assess the many factors involved in decision-making.

This project aims to fill that gap by prioritizing floodplain restoration sites along the Minnesota River. The goal is to identify locations that will most effectively reduce nutrient loads, slow runoff to mitigate flooding, and enhance habitat, ensuring that restoration efforts align with the needs identified through the 1W1P process.

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.

The Ecological Floodplain Inundation Potential (EcoFIP) tool will be used to identify and prioritize floodplain restoration sites that meet habitat goals, address nutrient pollution and mitigate flooding. Using hydraulic modeling and GIS data, EcoFIP pinpoints multi-benefit restoration opportunities. Along the Minnesota River, sites will be selected based on habitat priorities identified by watershed districts. Additionally, the nutrient module will enhance site prioritization by assessing nutrient reduction potential.

Studies of engineered and natural floodplains reveal that inundation allows the floodplain to function as a flow-through denitrification reactor. To validate and refine EcoFIP's nutrient reduction estimates, we will establish paired monitoring sites upstream and downstream of up to three well-connected floodplains. The sites will be modeled in EcoFIP to estimate nutrient reduction based on typical flows. After a year of data collection, we will model site-specific flows and calibrate EcoFIP's outputs accordingly.

Project results will be shared with watershed districts to support funding and implementation efforts. By taking a holistic, watershed-wide approach, this project will optimize resources by identifying and prioritizing sites with the greatest potential for success across multiple districts along the Minnesota River.

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?

At the completion of this project, we will provide maps of prioritized floodplain restoration projects that will improve habitat and reduce nutrient and sediment pollution on the Minnesota River. While not a specific focus of the EcoFIP model, we expect that these restoration projects will also improve flooding and provide other benefits associated with riparian wetlands. Prioritization maps, supporting data, and informational sessions will be provided to watershed districts along the Minnesota River. This project will support goals outlined in the 1W1P plans along the Minnesota River and will provide additional insight for those watersheds in the planning phase.

Activities and Milestones

Activity 1: Floodplain Restoration Site Prioritization

Activity Budget: $300,000

Activity Description:
Site level prioritization maps will be generated using the Ecological Floodplain Inundation Potential tool (EcoFIP). This model is divided into three tiers. The first two tiers identifies and prioritizes potential restoration sites, while the third tier develops restoration design concepts and evaluates their effectiveness. EcoFIP relies on multiple inputs including geospatial data, hydrology, and hydraulic modeling. The tool incorporates these inputs with known habitat metrics and other biogeochemical processes to identify sites that meet multiple restoration goals.

EcoFIP was developed by cbec eco engineering (now part of Verdantas) in 2018. The tool has been used on river systems throughout the nation to evaluate and prioritize potential floodplain restoration projects that meet specific habitat goals for individual species or guilds (i.e. waterfowl, fish, wetlands). Ongoing investment has led to the capability to prioritize floodplain projects by their nutrient reduction pollution potential. Prioritizing sites/projects based on their nutrient reduction potential, while also creating and enhancing habitat for key species will be a central focus of this effort. Given EcoFIP's suite of capabilities and the concerns identified in the 1W1Ps throughout the Minnesota River, this tool will serve as an essential step towards advancing and prioritizing specific floodplain areas for restoration.

Activity Milestones:

Description	Approximate Completion Date
Data Collection and identification of habitat goals	November 30, 2026
Tier 1: Large Scale inundation potential	February 28, 2027
Tier 2: Multi-objective Site Identification and Prioritization	August 31, 2027
Tier 3: Site evaluation and conceptual design	April 30, 2028

Activity 2: Nutrient Monitoring

Activity Budget: $183,000

Activity Description:
Nutrient testing will take place on the Minnesota River upstream and downstream at up to three floodplains that will be determined using geologic evaluation and validated for floodplain connectivity using EcoFIP. The monitoring sites will be selected where riparian areas represent well-connected, healthy floodplains, and where no tributaries enter the Minnesota River between the upstream and downstream sampling sites for each location. These parameters will constrain nutrient influx to the upstream portion of the river to determine the effectiveness of the floodplain in denitrification. The locations will be concentrated near Mankato to allow easy access for Dr. Beth Fisher and her students at Minnesota State University, Mankato to complete this research. Monitoring will be done with a combination of sediment coring and real-time nitrate sensors to monitor nitrate before and after floodplain flow.

After at least one year of data are collected, the information will be will be evaluated to determine the magnitude of the impact that floodplain inundation had on nutrient reductions. These data will be used to validate and calibrate the EcoFIP nutrient module to ensure we are accurately representing the effect floodplain restoration will have on nutrient loads moving through the Minnesota River.

Activity Milestones:

Description	Approximate Completion Date
Sensor Installation	August 31, 2026
Data Evaluation	November 30, 2027
Model calibration and validation	April 30, 2028

Activity 3: Information Dissemination

Activity Budget: $50,000

Activity Description:
Results and data derived from this project will be shared with watershed districts and the general public. Results of the project will be shared as online maps to provide the public and decision makers with easily accessible information that prioritizes restoration projects that will be most impactful towards achieving the goals identified in the 1W1P. More specific and detailed digital data will be disseminated to the watershed districts. These datasets are less relevant for the general public, but will be useful for watershed districts for planning, funding, and future implementation.

Presentations of the study results to watershed districts will be another mechanism to disseminate information. These meetings will provide an opportunity to go into details on the prioritized sites, why they were prioritized, and what benefits restoration at these sites would provide. These meetings could be held in person or virtually per the preferences of the watershed districts. Specifically, we will disseminate project results through existing stakeholder groups including the Greater Blue Earth River Basin Alliance and the Lower Minnesota River Watershed District.

Activity Milestones:

Description	Approximate Completion Date
Meetings to establish habitat metrics	October 31, 2026
Web Map available	June 30, 2028
Presentations	July 31, 2028

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Stephanie Day	cbec / Verdantas	Managing Activity relating to EcoFIP model. This model is designed to help identify and prioritize floodplain restoration sites that will meet project goals. Stephanie Day will be managing this aspect of the project in her role at cbec / Verdantas.	Yes
Carrie Jennings	Freshwater	Site Selection and Outreach	Yes
Seth Thompson	Freshwater	Technical Advisor	Yes

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?

Maps and data from this project will be provided to Watershed Management Organizations (WMOs) to guide restoration, secure funding, and support 1W1P implementation. Findings will strengthen grant applications for programs like the Clean Water Fund and other state, federal, and local initiatives. Long-term, EcoFIP's nutrient module can be refined with additional monitoring to enhance effectiveness. Future work, including expanded modeling and site assessments, may be funded through state agencies, watershed district budgets, and nonprofit partnerships. Ongoing outreach will help stakeholders apply findings for sustainable floodplain restoration and water quality improvements.

Project Manager and Organization Qualifications

Project Manager Name: Beth Fisher

Job Title: Associate Professor of Geology and Soil Science

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

Dr. Beth Fisher is an Associate Professor of Geology and Soil Science at Minnesota State University, Mankato, specializing in aqueous geochemistry, geomorphology, and nutrient cycling. Her multidisciplinary background allows her to integrate key aspects of geology, geochemistry, and groundwater-surface water interactions—critical components for understanding denitrification in floodplains. Her expertise in coastal dune morphology provides transferable insights into the geomorphic processes of sandy floodplains.

Dr. Fisher has extensive project management experience, including leadership on a USDA-funded project with a $1,000,000 science component cooperatively shared by three institutions. Her research in regenerative agriculture focuses on measuring and monitoring carbon and nutrient fluxes in soil and water, directly relevant to denitrification studies. Additionally, she has a decade of experience in open-source, Internet of Things, continuous, environmental monitoring across stormwater, agricultural, soil, and river systems, equipping her with the technical skills necessary for tracking nitrogen dynamics.

Prior to academia, Dr. Fisher managed employees for ten years, developing strong leadership and organizational skills applicable to large research projects. Since joining MNSU in 2019, she has secured over $700,000 in research funding, demonstrating her ability to attract resources and execute high-impact scientific investigations.

Organization: Minnesota State Colleges and Universities - Minnesota State University Mankato

Organization Description:

Minnesota State University, Mankato is a comprehensive regional university serving Southern Minnesota. Approximately

12,800 undergraduate students and 1800 graduate students are supported by 700 faculty members, with more than 3000 degrees completed per year. The university mission is to promote learning through effective undergraduate and graduate teaching, scholarship, and research in service to the state, the region and the global community. The College of Science, Engineering, and Technology extends that mission to prepare students for professional careers and advanced study, while connecting with local, regional, and global communities.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	$ Amount
Personnel								
Project Director		Management of project and staff			24%	0.24		$25,390
Graduate Student		Graduate Student supporting project director for tasks related to the project			7%	2		$60,000
Undergraduate technician		Undergraduate student technician support project director for tasks of project			7%	2		$20,000
							Sub Total	**$105,390**
Contracts and Services								
cbec / Verdantas	Service Contract	Running the proprietary EcoFIP model to identify and prioritize potential floodplain restoration sites along the Minnesota River.				0.75		$300,000
Freshwater Society	Subaward	Freshwater will lead the community engagement and dissemination efforts of the project. Includes salary support for Freshwater staff and local travel costs for round trip travel to the field site and to present at relevant local meetings.				0.32		$50,000
							Sub Total	**$350,000**
Equipment, Tools, and Supplies								
	Equipment	Trios UV nitrate sensor with wiper, protective cage, and cables. Six each at $11,415 totals $68,490.	One nitrate sensor will be placed upstream and downstream of each identified floodplain, up to three floodplains, for real-time monitoring of nitrate before and after flow through floodplain.					$68,490
	Tools and Supplies	Six environmental logging stations. $680 each using components from EnviroDIY.	Waterproof enclosure with data logger and solar power station will we required at each upstream and each downstream nitrate sensor for a total of six stations.					$4,080
	Tools and Supplies	Data plan from Hologram.io for each of the six monitoring stations, estimated data usage is $20 per	Real-time data streaming to the internet of things will allow for					$1,200

		month per station for 5 months of monitoring for two years.	tracking of changes with storm event and notification of sensor movement or failure.					
							Sub Total	**$73,770**
Capital Expenditures								
							Sub Total	**-**
Acquisitions and Stewardship								
							Sub Total	**-**
Travel In Minnesota								
	Miles/ Meals/ Lodging	Estimating three floodplain localities at 21, 30, and 76 miles from MSU campus * $0.63 per mile rate * 12 trips to each site per sampling season * 2 sampling seasons. Total $3,840.48 for project duration.	Travel to install and maintain water monitoring stations by MSU students and faculty.					$3,840
							Sub Total	**$3,840**
Travel Outside Minnesota								
							Sub Total	**-**
Printing and Publication								
							Sub Total	**-**
Other Expenses								
							Sub Total	**-**
							Grand Total	**$533,000**

Classified Staff or Generally Ineligible Expenses

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

Non ENRTF Funds

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

Total Project Cost: $533,000

This amount accurately reflects total project cost?

Yes

Attachments

Required Attachments

Visual Component

File: 56dac69b-4a6.pdf

Alternate Text for Visual Component

Figure shows the three tiers of EcoFIP with increasing detail to identify and prioritize restoration sites....

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 Commissioner's Plan 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:

Jeane McGraw, Minnesota State University, Mankato, Grants Specialist Coordinator

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

Yes, I understand