



Environment and Natural Resources Trust Fund

2025 Request for Proposal

General Information

Proposal ID: 2025-150

Proposal Title: Impact of Statewide Conservation Practices on Stream Biodiversity

Project Manager Information

Name: Christine Dolph

Organization: U of MN - College of Biological Sciences

Office Telephone: (612) 868-1565

Email: dolph008@umn.edu

Project Basic Information

Project Summary: Evaluate the effects of wetlands and riparian buffers on stream and river biodiversity and biological condition statewide, to inform stream management decisions.

ENRTF Funds Requested: \$300,000

Proposed Project Completion: June 30, 2028

LCCMR Funding Category: Water Resources (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 streams and rivers provide essential ecosystem services including drinking water, fisheries production, recreation and spiritual connection, and biodiversity protection. According to the MPCA's 2024 Impaired Waters List, 46% of streams that have been assessed in Minnesota do not meet the standards of the Clean Water Act. Most of these impaired streams are in poor biological condition; i.e., they do not support the expected biodiversity of freshwater species. Local and state agencies need to make decisions about how to prioritize resources for conservation measures that most effectively protect and restore these waters. While conservation practices such as wetland and riparian buffer restoration have received increased attention in recent years for their potential to cost-effectively mitigate water quality pollutants (such as nitrogen and phosphorus), the ways these practices affect stream biological condition at the watershed scale have not been thoroughly demonstrated. At the same time, state and local organizations have invested significant resources to collect detailed information about the diversity of aquatic communities in Minnesota streams. These data represent a vast and underutilized public resource that can be used to answer questions about the drivers of ecosystem health. However, these data have not yet been brought together in one place.

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 seeks to leverage the state's large investment in monitoring of streams and rivers to analyze the links between wetlands, riparian buffers and the biological health of freshwaters across the state. Quantifying these relationships will enable conservation managers, policy makers and the public to evaluate the impact of conservation practices from a holistic ecosystem-wide perspective and consider whether a fuller range of potential benefits can be achieved by conservation measures that target the river network at the watershed scale as opposed to restoration or management practices that only target an individual stream reach or farm field. We will apply advanced statistical and machine-learning techniques to identify current biodiversity status, trends over time, and key drivers impacting aquatic ecosystems in Minnesota, including hotspots of degradation in the Twin Cities Metro Area and Minnesota River Basin. We will investigate the linkages between conservation practice implemented at the watershed scale, including wetlands and riparian buffers, and the biological conditions of streams. We will partner with The Freshwater Society to communicate our findings to legislators, watershed districts boards, relevant state and tribal agency management-level staff, and the public.

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?

Based on our analysis, we will develop information for managers and decision makers about the impact of wetlands, riparian buffers, and other drivers on biodiversity at a watershed scale, for watersheds across the state of Minnesota. This project will also compile the array of biological monitoring data available from different local, state and federal agencies into a comprehensive, accessible database for Minnesota streams.

Activities and Milestones

Activity 1: Assembly of existing biological monitoring data from local, state, and federal agencies into a single database

Activity Budget: \$125,005

Activity Description:

We will compile biological monitoring data for streams in Minnesota, including fish and insect data. A very large amount of such information exists that has not yet been brought together in one place to address the causes and effective solutions to streams exhibiting impaired biological health. Such data are collected by the MPCA, DNR, EPA, USGS, MetCouncil, and watershed management organizations. Working with agency partners, these data will be pre-processed and harmonized by identifying common freshwater species assessed across datasets. This processing step is a critical one, as discrepancies in species identification, especially for highly diverse aquatic insects, are often a step that prevents these valuable data from being used in further analyses. We will gather environmental data for sampled streams, including the vast wealth of water chemistry data available from state agencies and USGS. Once assembled, this dataset will represent a novel and highly valuable resource for researchers and practitioners to examine questions related to stream biodiversity, water quality and restoration. In collaboration with agencies who collected the data, we will make this database publicly available to support future research efforts. This activity is anticipated to occur over the first year of the project from July 2025-July 2026.

Activity Milestones:

Description	Approximate Completion Date
Assembly of biomonitoring datasets from relevant local, state, and federal agencies	January 31, 2026
Processing and harmonization of freshwater species data	May 31, 2026
Availability of statewide database for freshwater species to the public	July 31, 2026

Activity 2: Analyze drivers of biological condition and freshwater species occurrence across the state of Minnesota

Activity Budget: \$75,632

Activity Description:

We will use compiled biological and environmental data sets together with statistical approaches to identify drivers of biological condition and the occurrence of freshwater species across Minnesota streams and rivers. In particular, we will examine the relationship between two land-use practices currently under consideration by watershed managers – wetlands and riparian buffers – and biological outcomes at the watershed scale. This work will leverage our previous experience evaluating the impacts of wetlands and riparian practices on water-quality outcomes for streams and rivers across Minnesota. This work will culminate in the development of an interactive online web tool (using the web app R Shiny; <https://www.rstudio.com/products/shiny/>), where users can view data and examine relationships between environmental drivers and the biological health of Minnesota streams. This activity is anticipated to occur over the second and third year of the project from July 2026-January 2028.

Activity Milestones:

Description	Approximate Completion Date
Analysis of stream and river biological monitoring data	July 31, 2027
Creation of app for data viewing	January 31, 2028

Activity 3: Communication of results to practitioners

Activity Budget: \$99,363

Activity Description:

Freshwater communications and education staff will distill salient research results into a high-level document and fact sheet for the purposes of communicating with legislators, watershed districts boards, and relevant, state and tribal agency management-level staff. Freshwater will share results with watershed districts and watershed management organizations through presentation of results at the Minnesota Association of Watershed Districts (December), the DNR Roundtable, and Minnesota Association of Soil and Water Conservation Districts annual conferences. Freshwater will also engage in one-on-one outreach to natural resource managers working for the Upper, Lower, and Shakopee Mdewakanton Sioux communities who manage reaches of the Minnesota River and its tributaries. Findings from the project will be incorporated into Minnesota Water Steward training modules. Minnesota Water Stewards is a community leadership development program that has partnered with 23 cities, counties, watersheds and nonprofits to train and certify 513 volunteers over 11 years. Graduates of the 9-month certificate program receive ongoing communication from Freshwater and convene annually. They work with their local watershed districts to collaboratively identify water issues and engage their communities in actions to address them. This activity is anticipated to occur over the third year of the project from October 2027-June 2028.

Activity Milestones:

Description	Approximate Completion Date
Create high level summary of findings for communication to general audience	October 31, 2027
Present results to professionals in Natural Resource careers	December 31, 2027
Incorporate results into Minnesota Water Steward training modules	March 31, 2028
Communicate results to tribal natural resource managers in the Minnesota River watershed	June 30, 2028

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Jacques Finlay	University of Minnesota	Co-Investigator - Finlay will contribute to study design, data analysis and communication of findings.	Yes
Carrie Jennings	Freshwater	Communications Support - Freshwater will help communicate results to stakeholders and partners across Minnesota.	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?

A publicly available and searchable database of biodiversity and environmental information will be permanently maintained by the University of Minnesota Data Repository (DRUM). This database will support future research investigating spatial and temporal drivers of ecosystem health. Findings from our research can be used to inform local, state and national funding and implementation priorities for conservation of Minnesota streams. This information can also be incorporated into existing biophysical models used to predict outcomes of management practices. We anticipate seeking additional state and federal funding in future to support the ongoing development of this knowledge.

Project Manager and Organization Qualifications

Project Manager Name: Christine Dolph

Job Title: Research Scientist

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

Christine Dolph is a research scientist in the Department of Ecology, Evolution and Behavior at the University of Minnesota. She is an expert in stream and river ecology, and has worked extensively with biological, physical and chemical datasets to examine relationships between land use, hydrology, water quality and stream health in Minnesota and across the Midwestern United States. She has previously collaborated with Minnesota state agencies including the Minnesota Pollution Control Agency and Minnesota Department of Natural Resources to evaluate methods used to monitor the health of Minnesota streams and rivers, and has conducted Environmental Protection Agency-funded research evaluating the success of stream restoration projects. She has prior experience coordinating large multi-institution, interdisciplinary projects and collecting and curating large publicly-available datasets.

Organization: U of MN - College of Biological Sciences

Organization Description:

The College of Biological Sciences (CBS) at the University of Minnesota is one of the only colleges dedicated to the biological sciences in the country. Research in the college spans the breadth of the discipline from ecology to biophysics to microbiology. Within CBS, the mission of the Department of Ecology, Evolution and Behavior (EEB) is to increase human understanding of biodiversity, its origins and maintenance, leading to an improved understanding of ourselves and how we may live sustainably.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
Personnel								
Principal Investigator		Leads project team in accomplishing project objectives			37.1%	2.01		\$215,485
Co-PI		Advises on study design, data analysis, and dissemination of findings.			37.1%	0.33		\$63,811
							Sub Total	\$279,296
Contracts and Services								
Freshwater Society	Sub award	Freshwater communications and education staff will work with the project team to communicate project findings with legislators, watershed districts boards, state and tribal agency management-level staff, as well as the public through their Minnesota Water Steward program.				0.15		\$17,200
							Sub Total	\$17,200
Equipment, Tools, and Supplies								
							Sub Total	-
Capital Expenditures								
							Sub Total	-
Acquisitions and Stewardship								
							Sub Total	-
Travel In Minnesota								
							Sub Total	-

Travel Outside Minnesota								
							Sub Total	-
Printing and Publication								
	Publication	Publication of scientific findings in open access journals	To communicate findings to the scientific community and general public.					\$3,504
							Sub Total	\$3,504
Other Expenses								
							Sub Total	-
							Grand Total	\$300,000

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				
In-Kind	University of Minnesota	Indirect costs associated with this proposal	Potential	\$164,000
			Non State Sub Total	\$164,000
			Funds Total	\$164,000

Total Project Cost: \$464,000

This amount accurately reflects total project cost?

Yes

Attachments

Required Attachments

Visual Component

File: [6ed24524-178.pdf](#)

Alternate Text for Visual Component

An image shows MPCA staff standing in a stream, a fish specimen, and MPCA's stream sampling manual. A map shows locations where stream biological data have been collected by MPCA. A flow diagram summarizes major project steps and outcomes. An illustration shows how biodiversity can be compared across watersheds....

Supplemental Attachments

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

Title	File
UMN approval letter	ab641eef-0fc.pdf

Administrative Use

Does your project include restoration or acquisition of land rights?

No

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:

Jacques Finlay - University of Minnesota, Carrie Jennings - Freshwater, Michelle Stockness - Freshwater, Kris Meyer - Freshwater, Launa Shun - University of Minnesota