Environment and Natural Resources Trust Fund

2026 Request for Proposal

General Information

Proposal ID: 2026-136

Proposal Title: What the Microorganisms in Our Water Tell Us

Project Manager Information

Name: David Mitchell

Organization: College of Saint Benedict

Office Telephone: (320) 363-3268

Email: dmitchell@csbsju.edu

Project Basic Information

Project Summary: This proposal involves isolating and counting microorganisms in local waterways to look for changes or patterns related to water flow, mixing and evolutionary pressures while training students for environmental careers.

ENRTF Funds Requested: $151,000

Proposed Project Completion: June 30, 2030

LCCMR Funding Category: Small Projects (G)

Secondary 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?

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.

The proposed project will develop a background profile and identify changes in numbers and types of microorganisms found in local waterways in Central Minnesota and major Minnesota rivers while simultaneously preparing and training students for future environmental careers. At present, most governmental efforts are limited to testing for coliform bacteria commonly found in soil, plants or the intestines of animals and humans but not groundwater. While this testing can identify excess levels of these potentially harmful bacteria and is important for human safety, it does not present a broad picture of the microorganisms in our waterways, which may include additional microorganisms (Escherichia coli, Pseudomonas, Enterococcus, Streptococcus or Staphylococcus) that can be disease-causing (pathogenic) in humans. Which microorganisms and at what numbers are important questions to answer in understanding how water can become infectious to humans, how microorganisms can increasingly become resistant to antibiotics or how these patterns may change over time. Answering these questions will prepare students for careers in environmental research and/or governmental testing.

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.

In this project, a faculty member and undergraduate researchers will isolate, count and test the biological abilities of this wider array of microorganisms at four to seven points in waterways, such as the Mississippi and Sauk Rivers and waterways around Collegeville at several distinct times (spring, summer and fall). In the laboratory, we will continue to test the biological abilities of isolated microorganisms, including resistance to antibiotics and/or changes in pH, temperature or salt concentrations to mimic what may happen as these microorganisms persist in waterways or rivers. We will report the results of our studies by creating and maintaining a database adds to what others are learning about these questions throughout the United States. These efforts will connect CSB and SJU students to other scientists, research methods, data collection and laboratory skills that they can directly apply to careers in state and national governments. In total, this research will add to what scientists know about our local waterways and at the same time develop important field and laboratory skills for undergraduate students looking for career opportunities in areas they know and may not realize exist.

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?

The faculty member and undergraduate researchers will create a long-term data set of the number, type and properties of some microorganisms in waterways Stearns County. The proposed work will provide a more complete picture of the rate, range and extent of disease-causing microorganisms in local waterways and will be shared with government and scientific stakeholders, which will support future decision-making. The project will also train undergraduate students and prepare them for careers in government, public health, public policy, and scientific research by building their skills and knowledge in the waterways, the laboratory, and working with data.

Activities and Milestones

Activity 1: Testing local waterways for the presence of microorganisms that can impact quality of MN waterways

Activity Budget: $50,730

Activity Description:
The first activity involves collecting water in sterile bottles in the spring, summer and fall from 4-7 local waterways, filtering out large debris and then growing microorganisms in the laboratory under conditions that will select and isolate strains of E. coli, Pseudomonas, Enterococcus, Staphylococcus or Streptococcus from bacterial mixtures. Counting is done either manually or with a laboratory machine. Doing this in several places at different times of year will be a monitoring activity for how water quality changes or remains steady. Laboratory techniques will be used to identify a particular strain of microorganism and add this information into the database described below. We plan to use the summer of 2025 to do base line testing so that we are ready to begin in the summer of 2026.

Activity Milestones:

Description	Approximate Completion Date
Collecting and successfully isolating desired microorganisms from 4-7 local waterways	September 30, 2026
Carrying out laboratory experiments with isolated microorganisms to test for novel properties/ability to adapt	December 31, 2026
Expanding the number of waterways sampled	August 31, 2027

Activity 2: Create, update and maintain a database of results that tracks changes or similarities in time and location

Activity Budget: $45,135

Activity Description:
The second major activity is to create, update and maintain a database of our results that tracks changes or similarities or time and location. As the project develops and expands it will become a long-term data set that has relevance for a variety of stakeholders – including local citizens and communities like the NEON group that has 20 sampling sites across the country but none in central Minnesota. Computer technology and contacts with people working in state government will create an easy-to-use network for sharing results, listening and asking questions.

Activity Milestones:

Description	Approximate Completion Date
Create and develop database of number and types of isolates recovered from local waterways	May 31, 2027
Connect with NEON scientists and discuss new ideas and experiments	May 31, 2027
Refine and publish database	May 31, 2028

Activity 3: Expand undergraduate students' knowledge of education and environmental career opportunities

Activity Budget: $55,135

Activity Description:
The project will expand knowledge of educational and environmental career opportunities by having two CSB and SJU students directly involved in doing all parts of this work for one full academic year and summer (eight total over the

four-year project). The students will develop skills and knowledge in the waterways, the laboratory and on computers that prepare them for careers in government, public health, public policy and scientific research. These skills include scientific writing, graph making, laboratory safety and techniques and data analysis – all elements of being a successful scientist working in an ecological or laboratory setting; networking as part of professional development; and gaining exposure to new data collection techniques, decision-makers and/or citizens in Minnesota.

Activity Milestones:

Description	Approximate Completion Date
Attend at least one undergraduate research conference or meeting annually	November 30, 2027
Meet with NEON scientists at meetings or in laboratories	August 31, 2028
Publish at least one manuscript in an undergraduate research journal on our experimental results	December 31, 2028

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?

Results will be shared with local governments, including the MPCA, the Midwest undergraduate scientific community, and larger nationwide groups like the National Ecological Observatory Network (NEON), which samples 20 different US waterways but none in central Minnesota. These groups work keep the waterways of Minnesota clean, useful and enjoyable, and a database of what is happening in real time supports these aims. The NEON database will allow us to feed our results into their network and compare/contrast results with other sites. Continued funds for this work will come from undergraduate research organizations, CSB and SJU, and private foundations.

Project Manager and Organization Qualifications

Project Manager Name: David Mitchell

Job Title: Professor of Biology

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

Dr. David Mitchell, project director, has been a faculty member in the Biology Department at the College of Saint Benedict and Saint John's University (CSB and SJU) for over 25 years. Since becoming interested in questions related to the waterways around CSB and SJU and central Minnesota in the early 2010's he has co-authored five manuscripts with undergraduate students at CSB and SJU, three thesis projects and two poster presentations (one at Posters on the Hill at the Minnesota State Capitol in St. Paul). He has worked with CSB and SJU students during a summer research period consistently since he arrived in 1998. In the classroom, his regular teaching assignments include a one-semester biochemistry laboratory and lecture course that uses examples of microorganisms and their abilities – both beneficial and harmful to humans. Outside of the classroom the CSB and SJU campus has several lakes and rivers on the 3000 Arboretum that incorporates the SJU campus. Several of these waterways lead directly to the Mississippi River–the most famous river in the Midwest and our country. On their journeys, these rivers pass through agricultural, industrial and residential areas – a diversity that raises questions about which microorganisms are present (and at what levels) and how the levels normal and pathogenic microorganisms change over time.

Organization: College of Saint Benedict

Organization Description:

The College of Saint Benedict and Saint John's University (CSB and SJU) are two nationally ranked Catholic and Benedictine, liberal arts colleges located four miles apart in Central Minnesota. Together, the institutions enroll 2,891 undergraduate students. CSB and SJU have engaged in a cooperative educational partnership for over 50 years, allowing the institutions to leverage their combined resources to expand opportunities for students. Led by a single president, the CSB and SJU offer a common undergraduate curriculum and unified academic departments.

Saint John's University, where the Biology Department is physically located, is surrounded by Abbey Arboretum, 2,944 aces of prairie, oak savanna, oak and hardwood forest, conifer forest, and lakes and wetlands. Saint John's Abbey has owned and cared for this land since 1862, and in 1933, it was designated a State Game Refuge. Wildlife protection is an ongoing land management priority, and the Abbey Arboretum voluntarily upholds the highest standards of FSC certification in all of its land stewardship efforts.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	$ Amount
Personnel								
Project Director		Lead research and supervise/mentor undergraduate researchers			10%	0.32		$47,303
Undergraduate Summer Researchers		Research microorganisms in waterways and create data set			8%	1.64		$70,102
Undergraduate Academic Year Researchers		Research microorganisms in waterways and create data set			0%	0.51		$18,000
							Sub Total	**$135,405**
Contracts and Services								
Azenta Life Sciences	Service Contract	Analyzing lab samples				0		$1,500
							Sub Total	**$1,500**
Equipment, Tools, and Supplies								
	Tools and Supplies	12-15 microbial isolation kits annually; case of agar plates; bacterial media supplies; microbiology laboratory medias; DNA Master mix and primers for 16s bacterial identification	Supplies for conducting research on microorganisms in local waterways					$4,095
							Sub Total	**$4,095**
Capital Expenditures								
							Sub Total	**-**
Acquisitions and Stewardship								
							Sub Total	**-**
Travel In Minnesota								

	Conference Registration Miles/ Meals/ Lodging	Travel for 2 undergraduates per year to 1-2 regional conferences/meetings (located in MN); 1-2 trips total, 150 miles per trip	To present project findings and interact with career environmental professionals					$6,000
							Sub Total	**$6,000**
Travel Outside Minnesota								
							Sub Total	**-**
Printing and Publication								
	Publication	Publication costs for 2-3 undergraduate manuscripts in open acces undergraduate research journals	To disseminate research findings/results					$4,000
							Sub Total	**$4,000**
Other Expenses								
							Sub Total	**-**
							Grand Total	**$151,000**

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				
In-Kind	College of Saint Benedict and Saint John's University	Faculty salary & benefits - academic year mentoring and research support over 4 years	Secured	$20,000
In-Kind	College of Saint Benedict and Saint John's University	Lab equipment and space	Secured	$10,000
			Non State Sub Total	**$30,000**
			Funds Total	**$30,000**

Total Project Cost: $181,000

This amount accurately reflects total project cost?

Yes

Attachments

Required Attachments

Visual Component

File: a6db5b3c-ed0.pdf

Alternate Text for Visual Component

Map of Stearns County with potential waterways circled....

Financial Capacity

Title	File
CSB Evidence of Good Standing, as of 3/11/2025	5b67f1d5-ce7.pdf
CSB 2024 Audited Financial Statements	36f78a06-c3c.pdf
CSB FY23 990	84a92392-01d.pdf

Supplemental Attachments

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

Title	File
Authorization Letter	dd121ed7-e2d.pdf
Publications - D. Mitchell and undergraduate researchers	e959960e-4f5.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 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:

Karlyn Forner - CSB+SJU

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