



Environment and Natural Resources Trust Fund

2027 Request for Proposal

General Information

Proposal ID: 2027-418

Proposal Title: Water Education and Well Testing for Karst Communities

Project Manager Information

Name: Andy Chambers

Organization: Science Museum of Minnesota

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Project Basic Information

Project Summary: SMM will provide Karst residents free nitrate well screening and train K-5 teachers with custom groundwater models to protect vital regional water resources and improve community science literacy.

ENRTF Funds Requested: \$295,000

Proposed Project Completion: June 30, 2029

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): SE

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

Region(s): SE

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.

Southeastern Minnesota's Karst geography—characterized by porous limestone, sinkholes, and "Swiss cheese" bedrock—creates a rapid conduit for surface pollutants to enter groundwater. This unique hydrogeology makes the region exceptionally vulnerable to nitrate contamination from fertilizer and manure runoff. Recent data and a formal EPA mandate have highlighted a critical public health crisis in this region, where elevated nitrate levels pose severe risks to infants (Blue Baby Syndrome) and pregnant women.

Despite this documented threat, significant barriers prevent an effective community response. Thousands of rural residents rely on private wells that are not regularly monitored by municipal agencies. These families face hurdles including high testing costs and a lack of access to professional-grade laboratory analysis.

Furthermore, a substantial "literacy gap" exists in local education. Standard science curricula often depict groundwater as a static "underground lake," failing to convey the dynamic, fast-moving reality of Karst systems. Without a foundational understanding of how surface activities directly and quickly impact their specific tap water, residents cannot make informed decisions regarding land use or water safety. This disconnect between a known environmental hazard and public understanding leaves many Minnesotans vulnerable to preventable health risks.

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 Science Museum of Minnesota proposes a dual-track strategy connecting research to community action. First, the Community Water Screening Initiative will host interactive family events at Karst-region schools and libraries. Families will explore water science and receive mail-in well-screening kits. Samples will be analyzed for combined Nitrate and Nitrite (NOx) at our St. Croix Watershed Research Station (SCWRS). Because SCWRS is a research facility rather than a certified drinking water lab, these results serve as preliminary screening. High NOx values will trigger a formal recommendation for follow-up testing with a drinking water certified laboratory to verify initial environmental screenings against specific safe drinking water standards.

Second, we will implement classroom exploration classes for 3rd–5th grade. The Center for STEM Education (CSE) will provide state standard supported, hands-on STEM experiences focused on Karst hydrogeology. We will fabricate durable groundwater models designed to simulate the region's porous bedrock and update existing exploration curricula to reflect current water-quality risks. By project completion, these models and lesson plans will be donated to the regional Educator Resource Center for long-term lending. This solution empowers communities with actionable screening data while equipping educators to foster long-term groundwater stewardship through specialized, local scientific tools.

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 protects Minnesota's groundwater by providing Karst-region residents with professional nitrate screening to inform conservation and health decisions. Utilizing the St. Croix Watershed Research Station enhances the state's capacity to monitor vulnerable aquifers. Results serve as a critical initial screening; elevated nitrate levels will trigger recommendations for professional follow-up testing to verify safety and account for potential sample contamination. Long-term preservation is achieved through classroom explorations; equipping teachers with Karst-specific curricula and models fosters a statewide culture of stewardship. These outcomes ensure Minnesota's water is monitored today and preserved through scientific literacy, fulfilling the ENRTF's purpose.

Activities and Milestones

Activity 1: Water Science Family Events

Activity Budget: \$100,000

Activity Description:

Objective: To foster community engagement and foundational environmental literacy regarding water safety in the Karst region.

Tasks & Implementation: The Center for STEM Education (CSE) will design and facilitate 10+ free family events at regional schools and libraries. Tasks include curating hands-on stations where children and caregivers explore the water cycle, groundwater movement, and testing procedures. CSE staff will use their "Statewide Outreach" model to transport all equipment and facilitate these interactive experiences directly to the community.

Outputs: 10 community events; 250 distributed educational packets; and 250 well-water testing kits provided to participating families.

Impact & Use: These events demystify complex hydrogeology and remove the intimidation barrier to scientific testing. By practicing the testing process at an event station, residents become empowered to participate in the data-collection phase. These events serve as the essential recruitment vehicle for the broader nitrate-testing initiative.

Evaluation: The CSE Evaluation group will use "Passport" completion metrics and participant surveys to measure increases in self-reported water literacy and intent to complete the well-testing process.

Activity Milestones:

Description	Approximate Completion Date
Delivery of 5 (out of 10) Family Events	July 31, 2028
Distribution of 250 (out of 500) Educational Packets	July 31, 2028
Distribution of 250 (out of 500) Well-water Testing Kits	July 31, 2028
Delivery of all 10 Family Events	December 31, 2028
Distribution of all 500 Education Packets	December 31, 2028
Distribution of all 500 Well-water Testing Kits	December 31, 2028

Activity 2: Well-Water Laboratory Screening

Activity Budget: \$57,000

Activity Description:

Objective: To provide professional-grade NO_x (Nitrite + Nitrate) screening to private well owners to identify potential groundwater contamination.

Tasks & Implementation: This activity involves kit fabrication (with instructions to minimize contamination), sample intake, and analysis. Residents mail samples to the SCWRS, where lab scientists will utilize a SEAL discrete analyzer for high-precision, high-volume nutrient analysis. Results will be reported as a combined NO_x value to balance cost-effectiveness with regional research standards.

Outputs: Individualized screening reports for 250+ residents; a localized data set of regional groundwater NO_x levels.

Impact & Use: Residents receive data that serves as a "first look" at their water quality. Because the lab is not a certified

drinking water facility, the primary impact is to identify at-risk wells. Any elevated result will be accompanied by guidance on how to seek certified testing for regulatory or health-verification purposes.

Evaluation: Success will be measured by kit return rates and follow-up surveys documenting how many residents with high screenings pursued certified secondary testing.

Activity Milestones:

Description	Approximate Completion Date
50% of Returned Samples Tested and Results Disseminated	July 31, 2028
100% of Returned Samples Tested and Results Disseminated	June 30, 2029

Activity 3: Groundwater Sessions

Activity Budget: \$138,000

Activity Description:

Objective: To modernize K-5 groundwater education by equipping regional teachers with Karst-specific curricula and durable physical models.

Tasks & Implementation: CSE will update the existing "Groundwater Session" curriculum to specifically address Karst hydrogeology and fabricate 16 specialized physical models that simulate porous limestone. CSE staff will deliver 20 classroom residencies, which serve as "in-classroom" professional development for 3rd–5th grade teachers on how to utilize these tools.

Outputs: 20 classroom explorations; 16 fabricated Karst groundwater models; updated teacher guides aligned with MN Academic Science Standards (e.g., 4E.1.1.1.2).

Impact & Use: Upon project completion, the models and curricula will be donated to the Regional Educator Resource Center. This creates a permanent lending library, ensuring that future educators have the specialized equipment necessary to teach students about the "Swiss cheese" bedrock beneath their feet.

Evaluation: Teacher post-residency surveys will measure gains in pedagogical confidence and content knowledge.

Activity Milestones:

Description	Approximate Completion Date
Development of Karst- Specific Groundwater Session	July 31, 2028
Development and Fabrication of 16 Karst Aquifer Models	September 30, 2028
Completion of All 20 Classroom Explorations in Karst Region Schools	May 31, 2029
Transfer of Aquifer Models and Lesson Plans to Regional Educator Resource Center	June 30, 2029

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
St. Croix Watershed Research Station	Science Museum of MN	The Research Station is the environmental wing of the Science Museum. Their team of analytical scientists will oversee laboratory analyses and data reporting for this project.	Yes
Southeast Service Cooperative	Southeast Service Cooperative	The Southeast Service Cooperative hosts the regional Educator Resource Center. They will receive the donated Karst-specific aquifer models and curriculum at the conclusion of the project to lend as a resource to educators in the region.	No

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.

Our dissemination plan spans three main stages: educator recruitment, stakeholder engagement, and sharing impact evaluation.

Educator recruitment will be through online and in-person outreach, including newsletters sent to SMM's statewide educator email list, notifications through our extended partner network (including the MN STEM Ecosystem and regional service cooperatives), and tabling at major educator conferences such as MEA and MESPA. We will promote these opportunities across all 87 counties, with particular attention to expanding access for schools and educators with the greatest need for resources. Information shared will focus on how the educational programming aligns with state standards and supports student learning. All materials will include acknowledgement of ENRTF funding support.

Wider stakeholder engagement will occur through school partners and their local communities, including local media engagement, press releases, and other targeted outreach to raise public awareness of ENRTF's support for this work and encourage actions that protect, conserve, and enhance Minnesota's environment and natural resources. The purchased cargo van will feature branding that acknowledges ENRTF funding support and be a visible promotion of that support as we drive across the state. This van will continue to serve as a school program delivery vehicle across Minnesota, supporting the long-term reach and sustainability of these efforts.

Participating educators will be surveyed to assess the program's impact on both their teaching and student learning. Results from this evaluation will be shared on the Science Museum of Minnesota's website and with education partners to broaden understanding of the benefits of informal STEM programs. The core water programming emphasizes the science of water and water conservation, highlighting actions students can take to protect their local water resources. The assemblies address human impacts such as pollution: the K–2 Assembly focuses on proper waste disposal, and the grades 3–5 Assembly challenges students to reflect on how their actions could prevent pollution. These experiences are designed to build lasting connections between students and their local waterways, fostering stewardship beyond the classroom.

Over time, the Science Museum of Minnesota will maintain connections with participating schools and explore opportunities for continued engagement beyond the duration of the project. We will share information about future partnership opportunities and other museum programs that support environmental education and water conservation. Through these efforts, we aim to build on the relationships and momentum established during this project, ensuring that the benefits of ENRTF support continue to reach communities statewide.

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?

Testing results are delivered directly to residents for immediate health action. To ensure long-term implementation, the fabricated groundwater models and Karst-specific curricula will be donated to the regional Educator Resource Center, enhancing the permanent, lending library for local teachers. This transitions the project from a direct service to a sustainable community resource. Future expansion or additional testing cycles would be funded through the Museum's diversified advancement efforts, including private foundations, corporate sponsorships, and competitive state grants.

Project Manager and Organization Qualifications

Project Manager Name: Andy Chambers

Job Title: Senior Manager of Learning & Instruction

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

Andy Chambers is the Senior Manager of Learning and Instruction in the Center for STEM Education at the Science Museum of Minnesota. Chambers is an experienced program manager and science educator who has been with the Science Museum of Minnesota since 2018. Both his Master's degree in Education and diverse career experiences have prepared him to lead programs for public engagement through science education. He is well-versed in STEM trends and best practices and skilled in translating science content into compelling experiences for students and teachers. He consistently strives to understand the evolving needs of Minnesota educators and provide them with high-quality and accessible science resources.

Chambers is committed to supporting Minnesota educators and students, and is a leading force in the Museum's commitment to reaching all 87 counties and 11 tribal communities in the state. In his role as Senior Manager of Learning and Instruction, Chambers provides strategic and operational leadership for the Science Museum's outreach programs including science assemblies, in-school residencies, and community events. He is a natural partnership builder dedicated to pursuing equity in education as demonstrated by his successes in convening educator advisory groups and leading SMM efforts in the National Science Foundation-funded "SABER: Spatial Ability and Blind Engineering Research" project, facilitating the creation of informal science content for blind youth who are often excluded from STEM learning and career pathways by educational materials designed only for sighted individuals.

Organization: Science Museum of Minnesota

Organization Description:

The Science Museum of Minnesota (SMM) is a science and technology center with innovative interactive exhibits emphasizing hands-on STEM learning, with scientific research, anthropological collections, and a nationally-recognized educational research and evaluation department. In addition to its 370,000 square-foot headquarter facility in downtown Saint Paul, the museum operates the world-class St. Croix Watershed Research Station in nearby Washington County. SMM is dedicated to collaborating with our community to create a world where everyone has the power to use science to make lives better.

The museum's STEM Education Department is composed of a highly-skilled team educators with expansive educational backgrounds, who both create and facilitate Science, Technology, Engineering, and Math (STEM) learning experiences for youth across a variety of contexts, including summer camps, field trip experiences, professional development and school outreach. Our outreach programming travels across the state and even into the Dakotas, Wisconsin, and Iowa. Our team coordinates with schools to provide engaging learning opportunities that connect students to science in ways

that resonate with them for decades to come. We assist teachers by providing educational resources and hands-on experiences that aid in their school year curriculum delivery.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
Personnel								
Operations Coordinator		The operations coordinator works in collaboration with the manager to schedule programming to schools and libraries in the Karst region and manage communication between the these partners and the Science Museum Learning and Instruction Specialists who will be delivering programming.			26%	0.4		\$27,000
Learning & Instruction Specialist		The learning and instruction specialists will develop the Karst specific groundwater exploration class and facilitate all family events and classes.			26%	1.5		\$106,000
Materials Coordinator		The materials coordinators help support family events and exploration classes by maintaining and packing all materials and equipment. They will assemble the kits containing the Karst groundwater models that will be used for the classes and then donated to the regional resource center.			26%	0.4		\$30,000
Program Manager		The manager is responsible for coordinating the teams participating in the distinct tracks. They ensure that the project stays on track with all activities and milestones. They will be the primary contact with the regional educator resource center to ensure handoff of the groundwater models and class curricula at the project's conclusion. They supervise the specialists and coordinators, and support staff scheduling and project and budget management.			26%	0.4		\$44,000
Research and Evaluation Associate		Museum evaluators will design formative and summative instruments that measure project impacts. This team will also help generate reports for the project.			26%	0.14		\$12,000
Exhibit Fabricator		The exhibit fabricator is responsible for constructing the Karst specific groundwater models.			26%	0.16		\$14,000
							Sub Total	\$233,000
Contracts and Services								
St. Croix Watershed	Subaward	The St. Croix Watershed Research Station will design the well-testing kits. They will process all returned				0.7		\$57,000

Research Station		samples and disseminate the results and follow up steps to Karst residents.						
							Sub Total	\$57,000
Equipment, Tools, and Supplies								
	Equipment	16 Karst specific groundwater models	These will be used to modernize groundwater education education modules and provide region-specific foundational understanding of the state's hydrogeology.					\$4,750
							Sub Total	\$4,750
Capital Equipment								
							Sub Total	-
Acquisitions and Stewardship								
							Sub Total	-
Travel In Minnesota								
							Sub Total	-
Travel Outside Minnesota								
							Sub Total	-
Printing and Publication								
							Sub Total	-
Other Expenses								
		Gift Cards	Incentives for Survey Completion. Project participants who complete a survey will be entered in a drawing to receive a gift card incentive.					\$250

							Sub Total	\$250
							Grand Total	\$295,000

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	All indirect project costs are provided in-kind by the Science Museum of Minnesota (federal indirect rate 47.93% on all direct costs)	In-kind contribution of indirects	Pending	\$141,639
			Non State Sub Total	\$141,639
			Funds Total	\$141,639

Total Project Cost: \$436,639

This amount accurately reflects total project cost?

Yes

Attachments

Required Attachments

Visual Component

File: [0b93c351-a58.pdf](#)

Alternate Text for Visual Component

A visual showing the Karst region of Minnesota along with action scenes from the SMM Groundwater exploration class and the SCWRS lab....

Supplemental Attachments

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

Title	File
Financial Statement	777015fc-3bd.pdf
Good Standing	95a0db2b-682.pdf
990	ce381cd8-918.pdf
Visual	fc249a83-a07.pdf
LCCMR LOS Chambers	7fc3e840-488.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?

N/A

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?

No

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")?

Yes

Do you certify that background checks are performed for background check crimes, as defined in Minnesota Statutes, section 299C.61, Subd. 2, on all employees, contractors, and volunteers who have or may have access to a child to whom children's services are provided by your organization?

Yes

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

N/A

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