Environment and Natural Resources Trust Fund
2019 Request for Proposals (RFP)

Project Title: **ENRTF ID: 119-C**

Water Lab: Engaging Minnesotans in Water Quality Challenges

Category: C. Environmental Education

Sub-Category:

Total Project Budget: $ 830,000

Proposed Project Time Period for the Funding Requested: June 30, 2022 (3 yrs)

Summary:

Water Lab would enable the Science Museum's 600,000 annual Minnesota visitors to conduct hands-on water analyses, learn about citizen water monitoring opportunities, and access near real-time statewide water quality information.

Name: Patrick Hamilton

Sponsoring Organization: Science Museum of Minnesota

Title: Director

Department:

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St. Paul MN 55102

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Location

Region: Statewide

County Name: Statewide

City / Township:

Alternate Text for Visual:

The Science Museum of Minnesota serves 900,000 people annually and reaches audiences statewide. Its Water Lab would provide Minnesotans access to citizen water monitoring opportunities and statewide water quality data.

_____ Funding Priorities _____ Multiple Benefits _____ Outcomes _____ Knowledge Base

_____ Extent of Impact _____ Innovation _____ Scientific/Tech Basis _____ Urgency

_____ Capacity Readiness _____ Leverage _____ TOTAL _____%

____ If under $200,000, waive presentation?

I. PROJECT STATEMENT

The Science Museum of Minnesota (SMM) seeks to create a public water lab to provide its over 600,000 annual Minnesota visitors opportunities to conduct their own hands-on investigations of many water quality challenges prevalent in Minnesota and to learn how these problems relate to their daily lives (e.g. How do cyanobacteria make lakes unsafe for swimming? How can people limit their exposure to lead and nitrates in water? Which contaminants are responsible for the most fish consumption advisories?)

The Water Lab will enable museum visitors to analyze selected physical, chemical, and biological characteristics of Minnesota water samples collected by the museum. Visitors to the lab will also learn about how to access water monitoring projects in their communities, such as the MPCA's citizen lake and stream monitoring programs, the LCCMR-recommended project "River Watch on the Minnesota River" and other citizen science water initiatives.

In addition to authentic analytical experiences, interactive exhibits will offer Water Lab audiences unprecedented access to dynamic information about the ever-changing nature of water quality across the state. For example, the Lab will collaborate with the LCCMR-recommended project "Providing Critical Water Quality Information for Lake Management" to provide museum visitors with access to near real-time maps of critical water quality variables such as clarity, algae, turbidity and color.

Minnesota has made major strides in recent decades in improving its water quality. However, chronic challenges persist, such as excessive sediment, chloride and nutrient pollution, while scientific research points to new emerging threats, such as pharmaceuticals and chemicals from personal care products passing through wastewater treatment plants and escaping into Minnesota's waterways. All of these issues will require a much more aware and engaged citizenry if they are to be adequately addressed. The Science Museum's intention is that the Water Lab become a vital public water engagement and information hub.

II. DESCRIPTION OF PROJECT ACTIVITIES

Activity 1: Water Lab Benches **Budget: $400,000**

With the assistance of an advisory committee (see Project Team/Partner below), SMM will develop, evaluate and fabricate several lab benches that encourage museum visitors to test actual Minnesota water samples for selected pollutants, such as chloride and nitrate, and informs them about water quality citizen science projects and other water stewardship opportunities.

Outcome	Completion Date
1. Develop, prototype, and evaluate lab benches.	*4/1/2020*
2. Fabricate and install final iterations of lab benches.	*1/1/2021*
3. Over 600,000 Minnesota visitors per year have access to the lab benches.	*6/30/2022*

Activity 2: Water Lab Adult and Young Adult Facilitators **Budget: $170,000**

SMM will use adult volunteers and paid young adult staff to facilitate visitor interactions with the lab benches. In particular, SMM will provide internships for a cohort of graduates from its high school youth program to create a professional development opportunity for these young adults while training them in water science.

Outcome	Completion Date
1. Recruit adult volunteer and paid young adult lab bench facilitators.	*9/1/2020*
2. Complete training of adult volunteer and paid young adult lab bench facilitators.	*1/1/2021*
4. Adult volunteer and paid young adult staff facilitate interactions with the lab benches.	*6/30/2022*

Activity 3: Visualizing Minnesota's Water **Budget: $200,000**

SMM will create new computer visualizations to enable museum visitors to examine Minnesota's watersheds, explore precipitation and runoff, and other water datasets by for instance collaborating with the LCCMR-recommended project "Providing Critical Water Quality Information for Lake Management." These visualizations will support the activities in the Water Lab to expand museum visitors understanding of water in Minnesota and will enable visitors to see issues raised in recent Minnesota water quality reports in new ways.

Outcome	Completion Date
1. Develop and prototype new water visualizations.	*4/1/2020*
2. Fabricate and install final iterations of new water visualizations.	*1/1/2021*
3. Over 600,000 Minnesota visitors per year have access to the visualizations.	*6/30/2022*

Activity 4: Water Lab Evaluation **Budget: $60,000**

SMM's Department of Evaluation and Research in Learning will employ best practices in museum evaluation including surveying visitors during all stages of Water Lab development. The ultimate goal is that visitors show a measureable change in their awareness of water quality issues (perhaps including content knowledge, interest, or importance) after using the lab and its components.

Outcome	Completion Date
1. Front-end evaluation to gauge current level of Minnesota water awareness by visitors	*11/1/2019*
2. Formative evaluation to test individual lab benches and exhibits with museum visitors	*6/1/2020*
3. Remedial evaluation to learn how overall exhibit is working and make modifications	*1/1/2021*
4. Summative evaluation to learn how the exhibit has impacted museum visitors	*6/30/2022*

III. PROJECT STRATEGY

A. Project Team/Partners

SMM's Patrick Hamilton, who has led a number of prior LCCMR-funded projects at the Science Museum, will head the team that oversees the completion of all project activities. He will work with an Advisory Committee whose members bring a wealth of expertise in various aspects of water research, policy, and management issues to inform all aspects of the Water Lab planning process. The committee members will include: **Amy Skoczlas Cole**, Managing Director, The Water Main, American Public Media Group; **Ali Elhassan**, Manager, Water Supply Planning, Metropolitan Council; **Shahram Missaghi**, Professor, Minnesota Extension, College of Agriculture, Food and Natural Resources Sciences, University of Minnesota; **Shannon Lotthammer,** Assistant Commissioner for Water Policy, Minnesota Pollution Control Agency; **Raj Rajan, PhD**, Research, Development & Engineering Vice President and Global Sustainability Technical Leader, Ecolab; and **Lark Weller**, Community Planner, Mississippi National River and Recreation Area, National Park Service.

B. Project Impact and Long-Term Strategy

The Water Lab will be an integral element of SMM's **Water Planet** – a long-term, museum-wide initiative that is leveraging all of the institution's assets (scientific research, exhibits, public programs, education outreach) to enhance awareness about the water crises we face *and* collectively develop solutions that lead to more sustainable water for more people. SMM will assume full responsibility for the Water Lab following the conclusion of LCCMR support.

C. Timeline Requirements

The timeline for the project is 36 months, from July 1, 2019 through June 30, 2022.

2019 Proposal Budget Spreadsheet

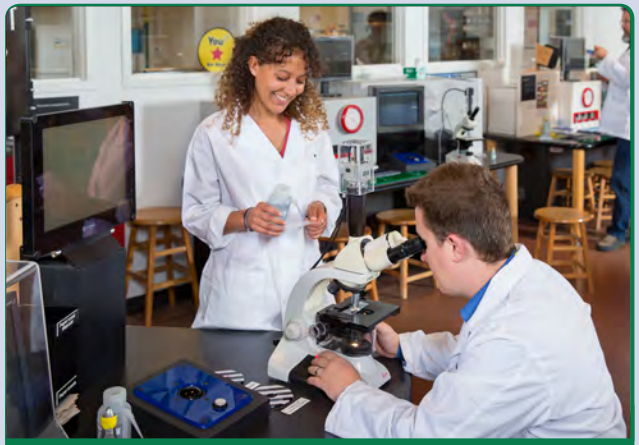
Project Title: Water Lab: Engaging Minnesotans in Water Quality Challenges

IV. TOTAL ENRTF REQUEST BUDGET 3 years

BUDGET ITEM	AMOUNT
Personnel: All of the personnel listed below are on soft money.	$ 625,000
Patrick Hamilton, The Water Lab Program Manager, 20% time over 36 mos., 72% salary, 28%	$ 78,000
Evelyn Ronning, The Water Lab Lead Evaluator, 7% time over 36 mos., 72% salary, 28% benefits	$ 16,000
The Water Lab Exhibit Developers and Designers, (10), 8% time over 36 mos, 72% salary, 28%	$ 183,000
The Water Lab Multimedia Developers (3), 18% over 36 mos, 72% salary, 28% benefits	$ 92,000
The Water Lab Prototypers and Fabricators (5), 9% time over 36 mos, 72% salary, 28% benefits	$ 62,000
The Water Lab Floor Supervisors (3), 11% time over 24 mos, 72% salary, 28% benefits	$ 28,000
The Water Lab Youth Manager (1) and Staff (7), 10% time over 24 mos, 75% salary, 25% benefits	$ 107,000
The Water Lab Evaluators (3), 14% time over 36 mos, 72% salary, 28% benefits	$ 59,000
Professional/Technical/Service Contracts: Water Resources Center, UMN	25,000
Equipment/Tools/Supplies:	$ 180,000
Water Lab exhibition fabrication materials and supplies (see breakout below)	$ 180,000
Lab bench manufacturing - $57,000	
Wood, plastic and metal supplies - $30,000	
Water Lab computers and monitors - $29,000	
Fasteners, buttons, wiring and cabling, visitor interface equipment - $21,000	
Seating and design elements - $15,000	
Welding - $19,000	
Material handling and local transport - $8,000	
Graphic materials - $1,000	
Acquisition (Fee Title or Permanent Easements): None	0
Travel: None	0
Additional Budget Items: None	0
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND $ REQUEST =	830,000

V. OTHER FUNDS	Amount	Status
SOURCE OF FUNDS	0	
Other Non-State $ To Be Applied To Project During Project Period:	0	
Other State $ To Be Applied To Project During Project Period:	0	
In-kind Services To Be Applied To Project During Project Period: The Science Museum is contributing its federally approved administrative rate of 41.97% to the Water Lab project.	348,000	Secured
Past and Current ENRTF Appropriation:	0	

Water Lab: Engaging Minnesotans in Water Quality Challenges



Water Lab will provide opportunities for the Science Museum's more than 600,000 Minnesota visitors each year to conduct their own hands-on investigations of Minnesota's water.

Water Lab visitors will interact with the latest scientific visualization tools to foster their explorations of Minnesota's water.

Water Lab will encourage more Minnesotans to assist with water monitoring to enhance the detection of emerging issues and to improve our understanding of long-term trends.

Water Lab will be aided by expert advice from the University of Minnesota, Metropolitan Council, Minnesota Pollution Control Agency, National Park Service, Minnesota Public Radio and Ecolab.

About the **Science Museum of Minnesota:**

The Science Museum of Minnesota overlooks the Mississippi River in downtown St. Paul.

The Museum served 866,000 people during its 2016 fiscal year and 176,000 students representing all 87 Minnesota counties were reached by field trips or outreach.

ENRTF ID: 119-C
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Program Manager Qualifications

Patrick Hamilton is the Director of Global Change Initiatives at the Science Museum of Minnesota. He also is a Fellow of the University of Minnesota's Institute on the Environment and a Board Director of District Energy St. Paul. Patrick has been producing exhibits and programs about environmental issues for the Museum for 34 years. Patrick led the teams that in 1999 created the **MISSISSIPPI RIVER GALLERY** and in 2004 opened the **BIG BACK YARD**, the museum's outdoor water and environmental science park. Patrick added the hands-on, interactive **GROUND WATER PLAZA** to the Big Back Yard in 2006 with the support and assistance of the Minnesota Ground Water Association. In 2007, Patrick co-curated with the American Museum of Natural History an international traveling exhibit about water.

Organization Description

The Science Museum of Minnesota, founded in 1907, is a large regional science museum located on the banks of the Mississippi River in downtown St. Paul. The Science Museum's programs combine research and collection facilities, a public science education center, extensive teacher education and school outreach programs, and an Imax Convertible Dome Omnitheater to provide science education to our audience of more than a million people per year.

St. Croix Watershed Research Station (SCWRS) is the field research station of the Science Museum of Minnesota. Founded in 1989, the SCWRS is located on the St. Croix River just south of Marine on St. Croix, Minnesota, approximately 35 miles from St. Paul. Staff research at the SCWRS focuses on scientifically and environmentally important questions on regional, national, and global scales. The research program emphasizes aquatic-based studies involving land-water interactions, biogeochemistry, hydrology, restoration ecology, and aquatic biology. Relevant issues include eutrophication, toxic pollutants, climate change, erosion and sedimentation, and biodiversity.

The Science Museum's building in downtown St. Paul is 370,000 square feet, built into the bluffs overlooking the Mississippi River. The museum's 70,000 square feet of exhibition space includes a 10,000-square-foot temporary exhibit gallery and five permanent galleries covering the topics of paleontology, physical science and technology, the human body, peoples and cultures of the Mississippi River, and the museum's collections. The Mississippi River flows just outside the windows of the museum and past the museum's ten acres of outdoor exhibits and programming space. The Science Museum of Minnesota employs over 600 full and part time staff and is supported by more than 1,000 dedicated volunteers.

The Science Museum of Minnesota is known worldwide for its interactive exhibits, dynamic traveling exhibitions, and internationally distributed large format films. The museum was an early innovator in the use of live theater as a humanizing interpretive tool and continues to be a training ground for other museums wishing to include live programming in their exhibit halls. The museum provides innovative staff development programs for teachers throughout the region and science education outreach programs for K-12 classrooms.