

**Environment and Natural Resources Trust Fund  
2014 Request for Proposals (RFP)**

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**Project Title:**

**ENRTF ID: 067-C**

River Lab: Engaging Minnesotans in Water Quality Issues

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**Category:** C. Environmental Education

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**Total Project Budget: \$** 730,747

**Proposed Project Time Period for the Funding Requested:** 3 Years, July 2014 - June 2017

**Summary:**

An exhibit with educational scientific laboratory experiences that measurably increases the awareness of Minnesotans to common river water pollutants and the implications of these contaminants to their daily lives.

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**Sponsoring Organization:** Science Museum of Minnesota

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**Location**

**Region:** Statewide

**County Name:** Statewide

**City / Township:**

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_____ Funding Priorities	_____ Multiple Benefits	_____ Outcomes	_____ Knowledge Base
_____ Extent of Impact	_____ Innovation	_____ Scientific/Tech Basis	_____ Urgency
_____ Capacity Readiness	_____ Leverage	_____ Employment	_____ TOTAL _____%



## I. PROJECT STATEMENT

The Science Museum of Minnesota seeks to create an exhibit with educational laboratory experiences that measurably increases the awareness of large numbers of citizens of the many river water quality challenges prevalent throughout much of Minnesota and how these problems relate to their daily lives (Can I swim in the river? Are the fish safe to eat?) To accomplish this aim, Science Museum exhibit staff, who are experts in translating science for public audiences, will partner with scientists at the Museum's St. Croix Watershed Research Station, who conduct scientific research on Minnesota's waters, to create authentic, hands-on scientific experiences for museum visitors that are based on the latest research findings and that will allow visitors to discover for themselves water quality issues invisible to the unaided eye.

The River Lab exhibit will occupy space along windows in the Museum with a panoramic view of the Mississippi River. The exhibit will be equipped with lab benches that offer real scientific experiments of selected physical, chemical, and biological characteristics of river water samples. Visitors to the Lab will be encouraged to use the lab benches to analyze river water samples and submit their results to the Museum's proposed Online River Data Portal, which then will in turn inform them about water quality stewardship steps that they can take in their daily lives and alert them to citizen science projects in their communities that focus on water quality issues. This project will be informed by the 2012 State of the River Report produced by the Friends of the Mississippi River and the National Park Service's Mississippi National River and Recreation Area and supported by the Capitol Region Watershed District, the Minnehaha Creek Watershed District and the McKnight Foundation.

Minnesota has made major strides in recent decades in improving the water quality of its rivers. Many severe point sources of pollution have been cleaned up and wastewater treatment plants dramatically improved. But chronic challenges persist while scientific research shows new threats emerging. Sediment erosion has been a serious problem for decades. 850,000 metric tons of sediment annually flow past SMM, a level ten times higher than in the mid 19<sup>th</sup> century. Pharmaceuticals and chemicals from personal care products are passing through wastewater treatment plants not designed to intercept them and entering our waterways with largely unknown but nonetheless disconcerting implications for the health of fish and ultimately for people who consume them.

## II. DESCRIPTION OF PROJECT ACTIVITIES

### Activity 1: River Lab Benches

**Budget: \$344,449**

With the assistance of an advisory committee (see Project Team/Partners), the Museum will develop, evaluate and fabricate lab benches in the River Lab exhibit that encourage museum visitors to test Mississippi River water samples for selected pollutants, such as suspended sediment, nitrates, chloride and E. coli bacteria. Each visitor to the River Lab will input their analyses to the Museum's proposed Online River Data Portal, which will store the data, compare them with results from other Minnesota rivers, evaluate the results in terms that people care about (Is the river swimmable? Are the fish safe to eat?), and inform them about water quality citizen science projects in their communities and stewardship opportunities.

Outcome	Completion Date
1. Develop, prototype, and evaluate lab benches	4/1/2015
2. Fabricate and install final iterations of lab benches	10/1/2015
3. Over 100,000 people per year interact with the lab benches	6/30/2017

### Activity 2: River Lab Adult and Youth Facilitators

**Budget: \$150,119**

The Museum will use adult volunteers and paid youth staff to facilitate visitor interactions with the lab benches. In particular, the Museum 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 river science.



## Environment and Natural Resources Trust Fund (ENRTF)

### 2014 Main Proposal

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

Outcome	Completion Date
1. Recruit adult volunteer and paid youth intern lab bench facilitators	6/1/2015
2. Complete training of adult volunteer and paid youth intern lab bench facilitators	9/1/2015
3. Adult volunteer and paid youth intern facilitators begin working in the River Lab	10/1/2015
4. Adult volunteer and paid youth facilitators interact with over 100,000 visitors annually	6/30/2017

#### **Activity 3: Mississippi/Minnesota Rivers Floor Map, Rain Table and Other**

**Budget: \$185,847**

##### **Exhibits**

The Museum will install a large walk-on map on the floor in front of the River Lab benches that will encompass much of the watersheds of the Mississippi and Minnesota Rivers from Lake Pepin to western and northern Minnesota so that lab visitors can explore the range of land uses that occupy the watersheds of these two major Minnesota rivers. The Museum also will create a large, multi-touch LCD table of the Minnesota and Mississippi River watersheds that will simulate rainfall and runoff wherever visitors touch it and produce other complementary exhibits that illustrate additional issues raised in the 2012 State of the River report.

Outcome	Completion Date
1. Develop, prototype walk-on map, Rain Table and complementary exhibits	4/1/2015
2. Fabricate and install final iterations of the map, Rain Table and other exhibits	10/1/2015
3. Over 100,000 people per year explore walk-on map, Rain Table and other exhibits	6/30/2017

#### **Activity 4: River Lab Exhibit Evaluation**

**Budget: \$50,332**

The Museum's Department of Evaluation and Research in Learning will survey visitors during all stages of River Lab exhibit development. The ultimate goal is that visitors, when asked to rate their confidence in talking about river water quality issues before and after their River Lab experience, will show a statistically significant increase in their confidence levels after using the exhibit.

Outcome	Completion Date
1. Front-end evaluation to learn what current level of river awareness by museum visitors	11/1/2014
2. Formative evaluation to test individual lab benches and exhibits with museum visitors	6/1/2015
3. Remedial evaluation to learn how overall exhibit is working and make modifications	11/1/2015
4. Summative evaluation to learn how the exhibit has impacted museum visitors	6/30/2017

### **III. PROJECT STRATEGY**

#### **A. Project Team/Partners**

The Museum's advisory committee (Lark Weller, National Park Service; Deb Swackhamer, Water Resource Center, University of Minnesota; Michael Sadowsky, BioTechnology Institute, University of Minnesota; Trevor Russell, Friends of the Mississippi River) will inform all aspects of the River Lab exhibit planning. The Science Museum's Patrick Hamilton and Field Station's Joy Ramstack Hobbs will lead the museum team that will oversee the completion of all project activities.

#### **B. Timeline Requirements**

The timeline for the project is 36 months, from July 1, 2014 through June 30, 2017.

#### **C. Long-Term Strategy and Future Funding Needs**

The River Lab would be the latest expression of SMM's ongoing commitment to realizing measureable improvements in citizen understanding of Minnesota environmental issues. SMM will assume full responsibility for the River Lab exhibit following the conclusion of LCCMR support.

## 2014 Detailed Project Budget

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

### IV. TOTAL ENRTF REQUEST BUDGET 3 years

BUDGET ITEM	AMOUNT
<b>Personnel:</b>	<b>\$ 582,247</b>
<b>Activity 1: River Lab Benches</b>	
Patrick Hamilton, River Lab Program Manager, 5% FTE over 36 mos., 70% salary, 30% benefits	\$ 15,247
Joy Ramstack Hobbes, Associate Scientist, 18% FTE over 36 mos., 70% salary, 30% benefits	\$ 41,382
Bette Schmitt, Exhibit Project Lead, 19% over 36 mos., 70% salary, 30% benefits	\$ 53,590
TBD, Graphic Designer, 17% over 24 mos., 70% salary, 30% benefits	\$ 20,629
TBD, 1 Graphic Fabricator, 7% each over 24 mos., 70% salary, 30% benefits	\$ 10,884
TBD, Prototyper, 11% over 24 mos., 70% salary, 30% benefits	\$ 16,552
TBD, 2 Media Designers, 12% over 24 mos., 70% salary, 30% benefits	\$ 24,328
TBD, 2 Exhibit Fabricators, 13% over 24 mos., 70% salary, 30% benefits	\$ 35,668
TBD, Project Production Mgr., 11% over 24 months, 70% salary, 30% benefits	\$ 16,827
Cary Forss, Exhibit Designer, 8% over 12 mos., 70% salary, 30% benefits	\$ 5,842
<b>Personnel Subtotal for Activity 1</b>	<b>\$ 240,949</b>
<b>Activity 2: River Lab Adult and Youth Facilitators</b>	
Robby Schreiber, Youth Alumni Program Mgr., 8% FTE over 24 mos., 70% salary, 30% benefits	\$ 9,115
TBD, Youth Staff, 10% over 24 mos., 91% salary, 9% benefits	\$ 63,664
TBD, River Lab Manager, 33% over 24 mos., 70% salary, 30% benefits	\$ 41,482
Joey Adamji, Youth Team Manager, 30% over 24 mos., 70% salary, 30% benefits	\$ 35,858
<b>Total for Activity 2</b>	<b>\$ 150,119</b>
<b>Activity 3: Mississippi/Minnesota Rivers Floor Map, Rain Table and Other Exhibits</b>	
Patrick Hamilton, River Lab Program Manager, 5% FTE over 36 mos., 70% salary, 30% benefits	\$ 15,247
Bryan Kennedy, Multimedia Coordinator, 7% over 36 mos., 70% salary, 30% benefits	\$ 21,951
TBD, Exhibit Developer, 21% over 24 mos., 70% salary, 30% benefits	\$ 34,428
TBD, Project Production Mgr., 11% over 24 months, 70% salary, 30% benefits	\$ 16,827
Cary Forss, Exhibit Designer, 8% over 12 mos., 70% salary, 30% benefits	\$ 5,842
TBD, 1 Graphic Fabricator, 7% each over 24 mos., 70% salary, 30% benefits	\$ 10,884
TBD, 2 Exhibit Fabricators, 13% over 24 mos., 70% salary, 30% benefits	\$ 35,668
<b>Personnel Subtotal for Activity 3</b>	<b>\$ 140,847</b>
<b>Activity 4: River Lab Exhibit Evaluation</b>	
Molly Phipps, Evaluator, 13% over 36 mos., 70% salary, 30% benefits	\$ 28,882
TBD, 2 Evaluation Data Collectors, 9% over 36 mos., 73% salary, 27% benefits	\$ 21,450
<b>Total for Activity 4</b>	<b>\$ 50,332</b>
<b>Equipment/Tools/Supplies:</b>	<b>\$ 148,500</b>
<b>Activity 1: River Lab Benches</b>	
3 monitors, track balls and computers for self-directed lab activity instructions	\$ 10,000
2 microscopes, camera and monitor set-ups (\$5,000 each) and lab analytical equipment such as temperature probes (5@ \$15.00 each), turbidimeter (\$1500), pH meter (\$600), spectrophotometer (\$7000) and materials to protect the equipment (\$2500)	\$ 21,675
Cabinetry for lab benches including bench tops, cabinets for computers and supplies, stools for participants (2-4/activity) and a space (hooks and cubbies) to hold lab coats, goggles and gloves for participants	\$ 27,225
Metals and hardware to construct lab benches and entry area with safety materials	\$ 2,000
Electronics for lab bench equipment (connecting computers and equipment)	\$ 3,000
Graphic materials on bench tops to designate places for supplies and wastes	\$ 16,000
Lab activity bench consumables: Safety - lab coats, goggles and gloves (\$6500/yr = \$13,000), bench activity consumables (\$900/activity/yr = \$5400), misc supplies (\$2600/year = \$5,200)	\$ 23,600
<b>Equipment/Tools/Supplies Subtotal for Activity 1</b>	<b>\$ 103,500</b>
<b>Activity 3: Mississippi/Minnesota Rivers Floor Map, Rain Table and Other Exhibits</b>	
Ideum multitouch table for Rain Table	\$ 24,000
3M graphic laminate for walk-on map	\$ 3,000
Cabinetry for Rain Table and other exhibits	\$ 18,000
<b>Equipment/Tools/Supplies Subtotal for Activity 3</b>	<b>\$ 45,000</b>
<b>TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =</b>	<b>\$ 730,747</b>

### V. OTHER FUNDS

SOURCE OF FUNDS	AMOUNT	Status
<b>Other Non-State \$ Being Applied to Project During Project Period:</b>	\$ -	N/A
<b>Other State \$ Being Applied to Project During Project Period:</b>	\$ -	N/A
<b>In-kind Services During Project Period:</b>	\$ -	N/A



# RIVER LAB

## ENGAGING MINNESOTANS IN WATER QUALITY ISSUES



The River Lab will be located along windows in the Museum with **panoramic views of the Mississippi River**.



The River Lab will be equipped with **lab benches** that encourage visitors to conduct their own analyses of Mississippi River water.



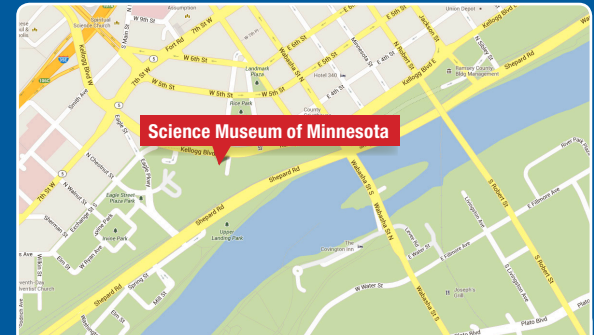
Complementing the River Lab will be a **large walk-on map of the Minnesota and Mississippi rivers** comparable in style to the world map in the Museum's lobby.

07/25/2013



A **Rain Table** will permit visitors to touch its surface and make it rain across the watersheds of the Minnesota and Mississippi Rivers and observe resulting runoff.

### About the Science Museum of Minnesota:



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



The Museum served more than 700,000 visitors during its 2012 fiscal year, including 86,143 students and teachers from 75 of Minnesota's 87 counties.



Page 5 of 6

120 kellogg boulevard west • saint paul, minnesota • 55102

## **Program Manager Qualifications**

Patrick Hamilton is the Director of Global Change Initiatives at the Science Museum of Minnesota. He also is a Principle Investigator with the University of Minnesota's National Center for Earth-surface Dynamics, a Resident 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 water and other environmental issues for the Museum for 29 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. Patrick's current project is **FUTURE EARTH** – exhibits and programs that explore the implications of humans as the dominant agents of global change.

## **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.