

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

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**Project Title:**

**ENRTF ID: 148-CH**

Inventing Tools and Technologies to Improve Water Quality

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**Category:** H. Proposals seeking \$200,000 or less in funding

**Sub-Category:** C. Environmental Education

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**Total Project Budget: \$** 136,433

**Proposed Project Time Period for the Funding Requested:** June 30, 2021 (2 yrs)

**Summary:**

Momentum leading up to and encompassing an aqua-hackathon will unite programmers, engineers, technology professionals and water experts. Outcome: Solutions to state water quality challenges and potential for an annual event.

**Name:** Sharon Moen

**Sponsoring Organization:** U of MN - Duluth

**Title:** Senior Science Communicator

**Department:** Minnesota Sea Grant College Program

**Address:** 31 W College St  
Duluth MN 55812

**Telephone Number:** (218) 726-6195

**Email** smoen@d.umn.edu

**Web Address** www.seagrant.umn.edu

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**Location**

**Region:** Northeast

**County Name:** Aitkin, Carlton, Cook, Itasca, Kanabec, Koochiching, Lake, Mille Lacs, Pine, St. Louis

**City / Township:**

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**Alternate Text for Visual:**

The visual includes a map of the northeast region of Minnesota and people working at a hackathon. It ends with images of water, new businesses, education and technology.

<input type="checkbox"/>	Funding Priorities	<input type="checkbox"/>	Multiple Benefits	<input type="checkbox"/>	Outcomes	<input type="checkbox"/>	Knowledge Base	
<input type="checkbox"/>	Extent of Impact	<input type="checkbox"/>	Innovation	<input type="checkbox"/>	Scientific/Tech Basis	<input type="checkbox"/>	Urgency	
<input type="checkbox"/>	Capacity Readiness	<input type="checkbox"/>	Leverage	<input type="checkbox"/>		TOTAL	<input type="checkbox"/>	%
<input type="checkbox"/> If under \$200,000, waive presentation?								



## **PROJECT TITLE: Inventing Tools and Technologies to Improve Water Quality**

### **I. PROJECT STATEMENT**

We propose to launch a 2-year project climaxing in a 30-hour data and engineering competition. The competition, an aqua-hackathon, will unite coders, engineers, tech professionals and water experts to generate enduring solutions to the water quality issues of NE Minnesota including:

- Developing water-focused education tools
- Generating solutions for failing septic systems and infrastructure
- Managing stormwater
- Curtailing contaminants in drinking water

This project is fashioned after the 2017 Lake Erie Hack, which challenged teams to create digital tools, hardware innovations, and engineering solutions that build the Blue Economy: an emerging economic sector focused on the sustainable use and stewardship of water. The Lake Erie Hack resulted in a winning micro-buoy designed to detect contaminants. The aqua-hackathon project we propose will spur learning, workforce development and Minnesota-based technologies to improve water quality. This project is poised to create a suite of new products to help the state meet its water quality goals and will generate innovative partnerships upon which businesses, agencies, communities and others can build. Project partners are already anticipating making the aqua-hackathon an annual event.

### **II. PROJECT ACTIVITIES AND OUTCOMES**

**Activity 1: Generate engagement, awareness and participation** – Partners will meet in person three times to:

- 1) Build specific challenges for teams
- 2) Develop, launch and execute an outreach plan
- 3) Prepare for the hackathon

Between meetings, partners will communicate regularly by phone and email, conduct outreach, seek sponsors and recruit participants. Activity 1 and opportunities to create marketable products will generate attendance, sponsorships, and public awareness of the LCCMR event and of water quality issues. The outreach plan will include site visits with the Planetarium’s portable dome showing Minnesota water stories, a product of a prior LCCMR grant. It will also involve recruiting talent through Willemsen’s interface with the Association for Computing Machinery and the Simulation and Interaction in Virtual Environments Lab as well as networks established by Downing’s and Fitzpatrick’s expertise in communication science and technology. Activity 1 will motivate more people to think strategically about water quality and engage in creating solutions. Success will be measured by number of people reached (social media engagement, media attention, audience), hackathon registrations and sponsorships.

#### **ENRTF BUDGET: \$120,000**

<b>Outcomes</b>	<b>Completion Date</b>
<i>1. Meetings (3) to refine scope of challenges and outreach strategy</i>	<i>February 2020</i>
<i>2. Outreach campaign (schools, colleges, tech industry, others)</i>	<i>October 2020</i>
<i>3. Travel for outreach and to garner sponsorships and industry/civic support</i>	<i>October 2020</i>



**Environment and Natural Resources Trust Fund (ENRTF)  
2019 Main Proposal Template**

**Activity 2: Conduct the first-ever aqua-hackathon in Minnesota** – A 30-hour hackathon for ~60 participants will put an eclectic mix of skilled people in creative spaces so they can begin developing tools for assessing and/or improving water quality. Project partners will help participants form teams to tackle one of ~5 challenges defined during Activity 1. Project partners will monitor and support progress during the event. After the 30-hour hackathon, a panel of expert reviewers will select the winning prototype product based on team presentations. Outcomes will be evaluated by the review panel, a participant survey and community/industry/media response.

**ENRTF BUDGET: \$9,000**

<b>Outcome</b>	<b>Completion Date</b>
1. 30-hour hackathon for an estimated 60 participants in an inspiring space with high-speed internet (likely on the UMD campus)	November 2020
2. Estimated 10 projects that have the potential to improve water quality	November 2020
3. Media event re hackathon and results	November 2020

**Activity 3: Pursue broader impacts** – After the hackathon, partners will work with teams to help introduce the innovations to potential investors and users with the expectation that one or more of the innovations will be favorably received by businesses, agencies or academia. Partners will arrange at least three presentations and work to communicate results to target audiences. The outcomes of this activity will be evaluated through responses to the innovations and strength of new networks.

**ENRTF BUDGET: \$7,433**

<b>Outcome</b>	<b>Completion Date</b>
1. Travel and presentations (est. 3) to local and state governments, communities (Ely, Duluth, Twin Cities)	May 2021
2. Final LCCMR Report	June 2021

**III. PROJECT PARTNERS:**

**Partners receiving ENRTF funding: None**

**Partners NOT receiving ENRTF funding**

<b>Name</b>	<b>Title</b>	<b>Affiliation</b>	<b>Role</b>
Tom Hollenhorst	Ecologist	U.S. Environmental Protection Agency	Data retrieval, geographic info. systems expert
Tim White	Bus. Dev. & Intellectual Property Manager	NRRI, UMD	Patent, commercialization lead
Dr. Robert Sterner	Director, Professor	Large Lakes Obs., UMD	Lake Superior expert

**IV. LONG-TERM- IMPLEMENTATION AND FUNDING:** This project will result in an estimated 10 prototype products for improving water quality in Minnesota. The tools and people creating them will be introduced to tech-industry representatives. This could result in jobs and the further development of the tools at the university or within the Minnesota business sector.

**V. TIMELINE REQUIREMENTS:** Partners can complete the project from July 2019 - June 2021.

**IX. SEE ADDITIONAL PROPOSAL COMPONENTS:** Proposal Budget Spreadsheet; Visual Component; Project Manager Qualifications and Organization Description

## 2019 Proposal Budget Spreadsheet

**Project Title: Inventing Tools and Technologies to Improve Water Quality**

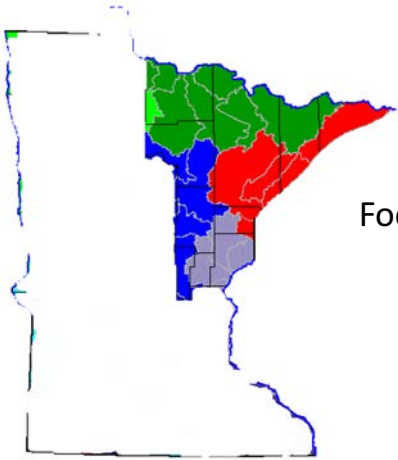
### IV. TOTAL ENRTF REQUEST BUDGET - 2 years

BUDGET ITEM (See "Guidance on Allowable Expenses")	AMOUNT
<b>Personnel:</b>	\$ 130,833
Sharon Moen, Manager/communication lead, (79% salary, 21% benefits), 10%, 2 years, \$16,922	
Dr. Richard Axler, Water quality expert, (75% salary, 25% benefits), 2.5%, 2 years, \$8,280	
Norman Will, data visualization lead, (79% salary, 21% benefits), 10%, 2 years, \$16,705	
Dr. George Host, Land-water interface expert, (75% salary, 25% benefits), 5%, 2 years, \$16,555	
Lisa Fitzpatrick, Novel product format lead, (79% salary, 21% benefits), 5%, 2 years, \$9,250	
Dr. Edward Downs, Computer-mediated simulations lead, (75% salary, 25% benefits), 5%, 2 years, \$12,788	
Cynthia Hagley, Outreach coordinator/facilitator, (75% salary, 25% benefits), 10%, 2 years, \$21,798	
Dr. Peter Willemsen, coding/computer tech lead, (75% salary, 25% benefits), 2.5%, 2 years, \$5,571	
Joel Halvorson, Interim Director, Marshall W. Alworth Planetarium, UMD, portable dome, MN water stories from prior LCCMR grant and instruction during hackathon. (75% salary, 25% benefits), 5%, 2 years, \$6,363	
2 undergraduate students, project support, \$10.78/hr each. 10 hrs/week each. 1.5 years, \$16,600	
<b>Professional/Technical/Service Contracts:</b> Audio Visual Resources (AVR), projector, screen, audio, AV technician (12 hrs).	\$ 2,500
<b>Equipment/Tools/Supplies:</b> smart water sensors (\$950, \$200); printing, easles, cables, markers, etc.	\$ 1,200
<b>Acquisition (Fee Title or Permanent Easements):</b> N/A	\$ -
<b>Travel:</b> 3 trips to Twin Cities to meet with potential sponsors and participants; travel to Ely and Twin Cities to share post-event results. (\$0.545/mile)	\$ 900
<b>Additional Budget Items:</b> Travel for an acclaimed tech innovator to serve as the lead reviewer (e.g. Sonaar Luthra, the creator of Water Canary, a device developed in response to Haiti's water crisis).	\$ 1,000
<b>TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =</b>	<b>\$ 136,433</b>

### V. OTHER FUNDS *(This entire section must be filled out. Do not delete rows. Indicate "N/A" if row is not applicable.)*

SOURCE OF FUNDS	AMOUNT	Status
<b>Other Non-State \$ To Be Applied To Project During Project Period:</b> Partners will secure sponsors for the hackathon that will donate prizes, prize money, print sponsorship, hackathon and student support. (\$8000)	\$ 8,000	<i>pending</i>
<b>Other Non-State \$ To Be Applied To Project During Project Period:</b> Partners anticipate charging a modest fee to participants (\$50 x 50 = \$2500); ~6 student scholarships will be offered via sponsorships.	\$ 2,500	<i>pending</i>
<b>Other State \$ To Be Applied To Project During Project Period:</b>		
<b>In-kind Services To Be Applied To Project During Project Period:</b> University of Minnesota unrecovered Indirect Cost at 33% of direct costs.	\$ 45,023	<i>secured</i>
<b>Past and Current ENRTF Appropriation:</b> N/A	\$ -	
<b>Other Funding History:</b> N/A	\$ -	

# Inventing Tools and Technologies to Improve Water Quality



Focus region spans 5 drainage basins and 10 Minnesota counties.

Aqua-hackathon will:

- Improve water quality
- Create opportunities
- Inspire technology



## Hacking Northeast Minnesota to Improve Water Quality Project Manager Qualifications and Organization Description

### Project Manager



Sharon Moen  
Senior Science Communicator  
Minnesota Sea Grant

Moen has worked as a science communicator for Minnesota Sea Grant for nearly two decades. Reflecting the respect of her peers, she is Vice-Chair of the Sea Grant Association's Network Advisory Council. Moen is known for engaging people in the stories of aquatic science through science communication workshops, magazine articles and the Our New Age of Water comic series. She is lead author on a synthesis of the food-fish aquaculture potential in Minnesota (2017) and continues to co-produce The Sea Grant Files podcast and research videos. The biography she wrote about Sea Grant's founder, Dr. Athelstan Spilhaus, debuted in 2015 with 5-star reviews on Amazon and Good Reads. She is committed to helping to create a scientifically literate society and riveted by the nexus of science and art. She earned a master's degree in Ecology, Evolution and Behavior from the University of Minnesota.

As evidence of her ability to successfully manage the aquahack project, Moen received an Outstanding Service Award from the University of Minnesota Duluth for organizing a professional chef competition (2011) that highlighted Lake Superior's sustainably managed cisco fishery. The event was so successful that it was held annually over the following three years (two of which were managed by Moen before the event was adopted by Lake Superior Magazine). Moen coordinated the Upper Great Lakes Law and Policy Symposium in 2016, which is resulting in a special issue of the Sea Grant Law and Policy Journal and was called, "... one of the best collaborations I've seen in my 25 years in environmental protection." (Mic Isham, chairman of the Great Lakes Indian Fish and Wildlife Commission).

### Organization Description



The University of Minnesota Sea Grant Program is part of the National Oceanic and Atmospheric Administration's (NOAA) Sea Grant Program, which supports 33 similar programs in coastal states throughout the United States and Puerto Rico. It receives funding through the NOAA Office of Oceanic and Atmospheric Research and the University of Minnesota. The program partners with local, regional and national organizations and is an integral member of the Great Lakes Sea Grant Network.

Minnesota Sea Grant's Vision: Citizens who use a science-based understanding of the environment to address issues concerning Lake Superior and Minnesota's aquatic resources and associated economies.

Minnesota Sea Grant's Mission: To facilitate interaction among the public and scientists to enhance communities, the environment and economies along Lake Superior and Minnesota's inland waters by identifying information needs, fostering research, and communicating results.