

**Environment and Natural Resources Trust Fund  
2018 Request for Proposals (RFP)**

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**Project Title:**

The SAFL Summer Experience

**ENRTF ID: 104-C**

**Category:** C. Environmental Education

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**Total Project Budget:** \$ 158,069

**Proposed Project Time Period for the Funding Requested:** 3 years, July 2018 to June 2021

**Summary:**

This project provides an annual interactive STEM experience for students and teachers at the St. Anthony Falls Laboratory, a world-renowned research facility in downtown Minneapolis along the Mississippi River.

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**Sponsoring Organization:** U of MN

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**Location**

**Region:** Metro

**County Name:** Hennepin, Ramsey

**City / Township:**

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**Alternate Text for Visual:**

Photographs of experimental facilities in the St. Anthony Falls Laboratory

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



**PROJECT TITLE: The SAFL Summer Experience**

**I. PROJECT STATEMENT**

The St. Anthony Falls Laboratory (SAFL), located on Hennepin Island in downtown Minneapolis, is a world renowned fluid mechanics laboratory associated with the College of Science and Engineering at the University of Minnesota. This project seeks to develop a pilot annual summer program titled “The SAFL Summer Experience” that welcomes up to 20 middle or high-school students (and 10-15 middle and high school teachers in the 2nd and 3rd year) to participate in a 3-day workshop of hands-on experiments at SAFL. The program will give these students and teachers the ability to explore applied complex environmental topics such as river management and restoration, water quality, and renewable energy through SAFL’s unique approach of integrating experiments, fieldwork, and numerical modeling.

As part of the historic Minneapolis riverfront for the past 80 years, SAFL is seen by millions of visitors to downtown Minneapolis every year, but very few know about the research happening here. SAFL conducts research of relevance to Minnesotans, including applied research for cleaner water, habitat restoration, and advances in renewable energy. Indeed, unseen to the public, SAFL boasts a multitude of facilities (flumes, basins, water tunnels, and even a wind tunnel – see Figure 1) that have been used to support research here in Minnesota and across the globe. This proposed project is a step in a coordinated effort to increase SAFL’s visibility and bring the public into one of the University of Minnesota’s most visible and valuable laboratories.

We endeavor to inspire the next generation of Minnesota students to investigate natural resources questions of critical importance. The SAFL Summer Experience program will inspire students to think creatively, to use trial and error to find the optimal approach for an experiment, and above all, let students use their curiosity to explore relevant natural resources issues using state of the art engineering and scientific tools.

**II. PROJECT ACTIVITIES AND OUTCOMES**

**Activity 1: Student SAFL Project Experience Program**

**Budget: \$109,490**

For the first year of the program, we will develop three days of activities and we will invite students into SAFL to explore them. These hands-on activities will revolve around the following themes that represent SAFL’s research strengths:

- **Hidden Work of Rivers and River Engineering:** Students will use a simple experimental set-up to explore how rivers move sediment. Through this activity, students will understand different types of river engineering, for example: to prevent scour and protect infrastructure from flooding, and/or to protect river ecosystems and restore habitat.
- **Clean up the Water:** Students will explore the different sources and causes of water pollution in rivers, lakes, and groundwater and different techniques, natural and engineered, for mitigating that pollution. Students will explore actions that they can use in their own lives to promote and protect clean water.
- **Capture Energy:** Students will explore topics of renewable energy including wind energy generation and developing energy sources such as marine hydrokinetic energy (water turbines).

For each of these themes, we will arrange travel logistics to bring in external speakers from industry, including consultants and state agency representatives to talk about their work and their careers.

We will hold the first 3-day student workshop in Summer 2019. We will work with a contact from the St. Paul school district and UMN STEM Center to identify particular schools and classrooms that would benefit from the program. These students would stay in on-campus dorms on the University of Minnesota campus under the supervision of at least two teachers as well as two undergraduate students who will serve as mentors from the UMN College of Science and Engineering. Students will be bussed over to the laboratory each day for activities and all meals would be provided through use of a University meal plan. For Years 2 and 3, we will save on personnel costs following the initial program development.



## Environment and Natural Resources Trust Fund (ENRTF)

### 2018 Main Proposal

#### Project Title: The SAFL Summer Experience

| Outcome                                                    | Completion Date |
|------------------------------------------------------------|-----------------|
| 1. Year One Student Workshop and Evaluation                | June 2019       |
| 2. Year Two Student Workshops (2 planned) and Evaluation   | June 2020       |
| 3. Year Three Student Workshops (2 planned) and Evaluation | June 2021       |

#### Activity 2: Parallel Teacher Workshops

**Budget: \$35,549**

While it is important to inspire students directly, teachers continually act as a source of passion and inspiration for their students. Thus, beginning in Year 2, we will host parallel 3-day summer workshops for 15-20 middle and high school teachers. Program content will be identical to the student workshops, but with an added emphasis on how teachers can incorporate such content into their classroom, exposing their students to SAFL's unique approach to research through hands-on experiments.

| Outcome                                   | Completion Date |
|-------------------------------------------|-----------------|
| 1. Year 2 Teacher Workshop and Evaluation | June 2020       |
| 2. Year 3 Teacher Workshop and Evaluation | June 2021       |

#### Activity 3: Creating Science Communicators

**Budget: \$13,030**

Science can be difficult to translate to the public, but open communication and transparency is critical to build public trust in scientific results. Therefore, we propose to integrate undergraduate journalism students into each workshop program to generate multimedia content such as photos, videos, and blog posts that can be posted online and through social media to highlight workshop participants' experiences. Both the journalism students and the workshop participants will learn how to create content and craft messages tailored to different audiences. Furthermore, as the workshop progresses, they will measure engagement and impact of such messages.

| Outcome                                                                                     | Completion Date |
|---------------------------------------------------------------------------------------------|-----------------|
| 1. Student developed communications materials (articles, photos, videos, blog posts)        | June 2021       |
| 2. Outreach metrics - Records of visits to blog posts and websites, social media engagement | June 2021       |

### III. PROJECT STRATEGY

#### A. Project Team/Partners

**University of Minnesota (funded through ENRTF)** – Barbara Heitkamp (Communications specialist): Project Manager, logistics coordinator, science communication lead; Dr. Jessica Kozarek (Research Associate) and Mr. Erik Steen (Associate Engineer): Primary program developers and workshop lead instructors; Amy Hansen (Research Associate), Andy Erickson (Research Associate), Chris Fiest (Associate Engineer): Supplemental program developers and workshop instructors; Benjamin Erickson (Facilities Manager) and SAFL Technical Staff: Technical program support staff; CSE Undergraduates: Mentors to workshop participants; Journalism Undergraduates: Program promotion and outreach content generation

**St. Paul Public Schools** - Marty Davis (Supervisor for PreK-12 Science): student and teacher recruitment

#### B. Project Impact and Long-Term Strategy

Following this pilot program, SAFL will pursue additional funding to continue and expand these programs after 2021, including expanding the program availability to students and teachers statewide. This program is the first step of a long-term effort to increase SAFL's visibility and connection with the general public and K-12 audiences throughout Minnesota.

#### C. Timeline Requirements

This project requires three summer seasons (2019 and 2020 and 2021) for workshop executions. Work will begin July 2018 to develop the program and the final report will be completed by end of June 2021.

## 2018 Detailed Project Budget

**Project Title: SAFL Summer Project Experience**

### IV. TOTAL ENRTF REQUEST BUDGET: 3 years

| <b>BUDGET ITEM</b>                                                                                                              | <b>AMOUNT</b>     |
|---------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <b>Personnel:</b>                                                                                                               | \$ 93,713         |
| Barbara Heitkamp, Project manager, 3% FTE, (79% salary, 21% benefits), \$9,253                                                  |                   |
| Jessica Kozarek, Research Associate, 7% FTE, (75% salary, 25% benefits), \$17,779                                               |                   |
| Erik Steen, Associate Engineer, 7% FTE, (79% salary, 21% benefits), \$13,516                                                    |                   |
| Chris Feist, Associate Engineer, 2% FTE, (79% salary, 21% benefits), \$3,058                                                    |                   |
| Benjamin Erickson, Laboratory Research Coordinator, 2% FTE, (79% salary, 21% benefits), \$4,614                                 |                   |
| Andy Erickson, Research Associate, 2% FTE, (75% salary, 25% benefits), \$3,921                                                  |                   |
| Amy Hansen, Research Associate, 2% FTE, (75% salary, 25% benefits), \$4,258                                                     |                   |
| SAFL Technical Staff, 2% FTE, (79% salary, 21% benefits), \$20,454                                                              |                   |
| 3 Undergraduate Science and Engineering Student Interns (3 interns per year) (100% salary), \$11,913                            |                   |
| 1 Undergraduate Journalism Student Interns (1 intern per year) (100% salary), \$4,945                                           |                   |
| <b>Professional/Technical/Service Contracts:</b>                                                                                |                   |
| <b>Equipment/Tools/Supplies:</b>                                                                                                | \$ 16,500         |
| Lumber - for use in building experimental set-ups for activities (\$3,000)                                                      |                   |
| Building Materials for Experimental Set Up - Misc. items needed to build experimental setups for workshop activities (\$10,000) |                   |
| Sand - for use in experiments (\$1,500)                                                                                         |                   |
| Cameras and Related Equipment - For use in documenting workshop activities and interviews (\$2,000)                             |                   |
| <b>Acquisition (Fee Title or Permanent Easements):</b>                                                                          | N/A               |
| <b>Travel:</b>                                                                                                                  | \$ 14,420         |
| Parking Ramp - for parked vehicles at dorms (\$2,100)                                                                           |                   |
| Lodging, Food, meals, and mileage for External (Minnesota-located) Speakers (\$12,320)                                          |                   |
| <b>Additional Budget Items:</b>                                                                                                 | \$ 33,436         |
| University of Minnesota Conference and Event Services: Lodging and Meal Plans for all workshop participants (\$28,126)          |                   |
| Passenger van rental (\$2,310)                                                                                                  |                   |
| Printing Communications Materials (\$3,000)                                                                                     |                   |
| <b>TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =</b>                                                          | <b>\$ 158,069</b> |

### V. OTHER FUNDS

| <b>SOURCE OF FUNDS</b>                                                                                      | <b>AMOUNT</b> | <b>Status</b>  |
|-------------------------------------------------------------------------------------------------------------|---------------|----------------|
| <b>Other Non-State \$ To Be Applied To Project During Project Period</b>                                    | N/A           |                |
| <b>Other State \$ To Be Applied To Project During Project Period:</b>                                       | N/A           |                |
| <b>In-kind Services To Be Applied To Project During Project Period:</b> Unrecovered UMN overhead (54% MTDC) | \$ 85,357     | <i>Secured</i> |
| <b>Past and Current ENRTF Appropriation</b>                                                                 | N/A           |                |
| <b>Other Funding History</b>                                                                                | N/A           |                |





« The St. Anthony Falls Laboratory (left) sits along the Mississippi River just downstream of the St. Anthony Falls and across the river from downtown Minneapolis. Both it and the Outdoor StreamLab, SAFL's experimental stream channel (below), are prominent, visible features along the historic Minneapolis waterfront. »



« SAFL's Main Channel, capable of moving 300 cfs »

Inside SAFL, research projects ranging from testing different wind farm configurations, looking at fish passage issues through culverts, improving design of stormwater infrastructure, and reducing nutrients in our waterways are conducted using the lab's unique array of facilities and experimental spaces.

» SAFL's Wind Tunnel, capable of generating hurricane-force winds



Aside from the physical space, the ability, ingenuity, and productive enthusiasm of SAFL's research and technical staff are one of SAFL's greatest assets. With a full machine and fabrication shop to hand, SAFL's staff can create innovative set-ups and experiments that are ideal for both research and educational purposes.



» SAFL's EcoFlume is designed specifically to study interactions between water flow and aquatic organism physiology.

Students attempt to bring their experimental 'rivers' to equilibrium in SAFL's half-pipe flumes. »



» A SAFL graduate student holds a cross-sectional 'peel' of sediments deposited in an experimental delta.

## Project Title: **The SAFL Summer Experience**

### **Project Manager Qualifications & Organization Description**

#### **Project Manager**

Barbara Heitkamp serves as the Communications Specialist for the St. Anthony Falls Laboratory at the University of Minnesota. She has served in that position since June 2014, although her tenure with the St. Anthony Falls Laboratory goes back to August 2011 when she started as a Research Scientist with the SAFL Research Staff.

Barbara has organized and executed several outreach programs during her tenure at SAFL, including:

- **Summer Institute on Earth-surface Dynamics (SIESD):** Sponsored by a continuing NSF grant, Barbara has served as the technical and logistics coordinator for an annual summer workshop for graduate students and early-career academics called the Summer Institute on Earth-surface Dynamics (SIESD). Hosted at SAFL for 7 out of 8 years, the SIESD brings approximately 40 students for lectures, networking, and research. Barbara is in charge of application submission, arranging the technical schedule, and overall logistics (including lodging, transport, and meals) for the workshop.
- **Sip of Science:** Sip of Science is monthly public science happy hour at the local Aster Café where scientists are invited to speak about their research to a general public audience. Ongoing since 2010, Sip of Science generally attracts between 40-70 attendees a month. Barbara is in charge of arranging speakers, managing registration, and emceeing the event.
- **Partnership for River Restoration and Science in the Upper Midwest:** Barbara is the primary coordinator for a SAFL-sponsored regional network called the Partnership for River Restoration and Science in the Upper Midwest. A 700-member strong network across the Midwest, this organization looks to bring together stream restoration professionals regularly for knowledge exchange and dialogue. Barbara curates the organization's website, organizes a webinar series, and serves as the technical and logistics coordinator for an annual symposium hosted in different cities throughout the Midwest. She coordinates two volunteer committees to help drive the technical content of the symposium as well as promote the symposium and overall organization across the region.
- **Website and Social Media Outreach:** Barbara is in charge of content on SAFL's website as well as SAFL's social media, tailoring content to reach specific audiences.
- **SAFL Tours:** Barbara coordinates the SAFL tour program, which has reached more than 1,800 people in the last 3 years.

#### **Organizational Description**

The St. Anthony Falls Laboratory (SAFL) of the University of Minnesota has 42,000 square feet of laboratory research space dedicated to environmental fluid mechanics research and testing. SAFL is located on the banks of the Mississippi River across from downtown Minneapolis, MN. For this project, several of our highly unique facilities will be utilized including our Atmospheric Boundary Layer Wind Tunnel, our half-pipe experimental flumes, the Outdoor StreamLab, among others. The project team includes several of our professional research staff who will work to create a unique workshop experience for program participants.