



Environment and Natural Resources Trust Fund

M.L. 2025 Approved Work Plan

General Information

ID Number: 2025-144

Staff Lead: Noah Fribley

Date this document submitted to LCCMR: June 9, 2025

Project Title: Addressing 21st Century Challenges for the St. Croix

Project Budget: \$243,000

Project Manager Information

Name: Jason Ulrich

Organization: Science Museum of Minnesota - St. Croix Watershed Research Station

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Project Reporting

Date Work Plan Approved by LCCMR: June 24, 2025

Reporting Schedule: March 1 / September 1 of each year.

Project Completion: June 30, 2028

Final Report Due Date: August 14, 2028

Legal Information

Legal Citation: M.L. 2025, First Special Session, Chp. 1, Art. 2, Sec. 2, Subd. 04I

Appropriation Language: \$243,000 the first year is from the trust fund to the Science Museum of Minnesota for the St. Croix Watershed Research Station to develop a watershed model to identify potential hydrologic and water quality impacts to the lower St. Croix River over the next 75 years and inform future planning and management in the watershed.

Appropriation End Date: June 30, 2028

Narrative

Project Summary: A St. Croix River watershed model will be developed to identify potential hydrologic and water quality impacts to the Lower St. Croix River over the next 75 years.

Describe the opportunity or problem your proposal seeks to address. Include any relevant background information.

Changing climate and watershed conditions in the 21st century present challenges to the St. Croix River Basin (SCRB), one of the most pristine large river systems in the US. Over the last 15 years, changes in precipitation and intense storm events have increased flooding and higher-flow periods throughout the SCRB, while in other years prolonged drought and low-flow periods have occurred. These trends are consistent with regional climate projections for the next 75 years. The SCRB is mostly covered in forests, lakes and wetlands; nevertheless, phosphorus from agriculture and wastewater treatment plants has degraded water quality in the lower river's in-stream lakes, and increased precipitation and population in the future will likely increase these phosphorus exports. The upper SCRB also contains a considerable number of dams; however, their flood, sediment, and phosphorus storage benefits are not known, and efforts to remove aging dams are ongoing. In the face of these potential changes, scientists, managers, and the public do not yet have clear data on how SCRB will respond. Given these uncertainties, this study will provide scenario-driven insights into how flow and water quality in the economically, culturally, and ecologically vital SCRB may be impacted by future climate and watershed changes.

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.

We propose developing a comprehensive watershed model of the SCRB that will predict hydrologic and water quality impacts from potential climate and watershed changes over the next 75 years. The model will simulate a range of possible climate scenarios as well as possible changes to landuse/landcover (e.g., changes in agriculture, forest, population/development), increased agricultural BMPs, and decreased dams/reservoirs. While the entire SCRB will be modeled, the focused study area will be the Lower St. Croix reaches (Taylors-St. Croix Falls to Lake St. Croix), where recreational use is highest.

Potential hydrologic impacts will be defined by predicted changes in hydrologic variables such as frequency, magnitude, duration and seasonal timing of flood- and drought flow events, while potential water quality impacts will be expressed by predicted changes to the masses and seasonal timings of sediment/phosphorus loads. As such, these results of future SCRB hydrology and water quality can be directly related to the SCRB's ability to provide economic, social, and ecological benefits in the future.

Results will be communicated via agency-focused resource impact assessments (specific to resources such as boating, swimming, species habitats, etc.) and GIS maps, as well as public-focused web newsletters and social media outreach.

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 is designed to inform the public and directly aid local, state and federal agencies in planning and prioritizing future SCRB management actions by helping answer questions such as: (1) Will flood events become more numerous or damaging? - and to what degree will probable decreases in dams and reservoirs affect this? (2) How will potential changes in high- and low flow regimes affect boating, camping, fishing and overall ecology (e.g., mussels, non-game fish, riparian tree species) in the River? (3) Is water quality in Lake St. Croix expected to improve or further degrade?

Project Location

What is the best scale for describing where your work will take place?

Watershed(s): Kettle River, Snake River, Upper St. Croix River, Lower St. Croix River,

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

Watershed(s): Kettle River, Lower St. Croix River, Snake River, Upper St. Croix River,

When will the work impact occur?

During the Project and In the Future

Activities and Milestones

Activity 1: Develop St. Croix River Watershed Model

Activity Budget: \$151,000

Activity Description:

We will build a SWAT hydrologic and water quality model for the St. Croix River Basin (SCRB). We will use high-resolution soils, landuse and elevation data, and incorporate all streams, lakes and dams. We will evaluate landuse changes over the calibration period (2000-2022) and if appropriate use a time-varying landuse dataset. Wastewater treatment plant loads will be incorporated using state agency datasets. The model will be calibrated using existing discharge and water quality datasets from local, state, and federal agencies. To improve the model, we will collect sediment cores from six backwater/riparian lake sites to measure sediment/phosphorus deposition rates. These sites were previously cored in 2005 and re-coring will provide a measure of sediment/phosphorus deposition in these areas over the last 20 years. These data will provide insights into how sediment/phosphorus storage has changed in this reach of the river and will be used to more accurately configure and calibrate simulated sediment/phosphorus flux. Early in the project, a Technical Advisory Committee (TAC) will be formed comprising experts from agencies and universities. The TAC will review project progress every 6 months and provide advice, feedback and additional data sources as needed.

Activity Milestones:

| Description | Approximate Completion Date |
|---|-----------------------------|
| Acquire and compile data necessary for model creation/calibration | October 31, 2025 |
| Conduct sediment coring field work and analyze results | March 31, 2026 |
| Complete initial SWAT model | June 30, 2026 |
| Calibrate SWAT model | September 30, 2026 |

Activity 2: Use St. Croix River Watershed Model to Simulate Impacts from Future Climate and Watershed Scenarios

Activity Budget: \$92,000

Activity Description:

In this activity, the SCRB SWAT model will simulate hydrologic/water quality variables for the period 2025-2100 using a developed set of future scenarios, each comprising different combinations of projected future climate and watershed conditions. Future climate scenarios will use the latest projected climate data available for the region, and will be adapted from existing National Park Service climate planning work. We will convene a Scenario Development Workshop -- consisting of TAC members, natural resource managers, and other SCRB stakeholders -- to decide the composition of future modeling scenarios. Scenario development discussions will focus on degree of future watershed changes such as increased row-crop agriculture and population/urbanization, decreased forest cover, increased agricultural BMPs, and decreased dams/reservoirs. Results will be summarized in a final report, 1-page fact sheet, as well as resource-specific impact assessments (e.g., for boating, camping, swimming; mussel, fish habitats) and GIS maps intended for management agencies. The Scenario Development Workshop will be convened at SMM's St. Croix Watershed Research Station or location nearby, minimizing costs. Specifications of reporting deliverables will be determined from TAC meeting and Scenario Development Workshop feedback.

Activity Milestones:

| Description | Approximate Completion Date |
|--|-----------------------------|
| Organize and convene St. Croix River Scenario Development Workshop | October 31, 2026 |

| | |
|---|-------------------|
| Simulate future scenarios with SWAT model and compile modeling results | February 28, 2027 |
| Create reporting deliverables (fact sheet, full report, impact assessments, GIS maps) | June 30, 2027 |

Project Partners and Collaborators

| Name | Organization | Role | Receiving Funds |
|-----------------|-----------------------|--|-----------------|
| Dr. Thomas Parr | National Park Service | Assisting with research advice, review, writing, analysis. | No |
| Richard Damstra | National Park Service | Facilitate access to water quality datasets; assistance with review and analysis | 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.

Project objectives, intermediate, and final results will be communicated to public and professional audiences via Science Museum social media, and presentation at two local scientific conferences during the project. In addition, we will partner with a local media organization, St. Croix 360, which has a large readership interested in the St. Croix, to publish articles about the project from beginning to end. The project's final results, analyses, and implications will be documented in a final report, 2-page summary fact sheets, and a peer-reviewed journal article. All project deliverables will be available on Science Museum websites for public access in the future. The completed St. Croix Watershed model will be shared with technical audiences upon request whereby it may be used for future St. Croix conservation planning and goal setting. All digital and hard-copy media deliverables, presentations and publications will prominently acknowledge the Environment and Natural Resources Trust Fund using the trust fund logo and attribution language.

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?

Project objectives, intermediate, and final results will be communicated to public and professional audiences via Science Museum social media, and presentation at two local scientific conferences during the project. In addition, we will partner with a local media organization, St. Croix 360, which has a large readership interested in the St. Croix, to publish articles about the project from beginning to end. The project's final results, analyses, and implications will be implemented by management agencies after the project is completed, and all project deliverables will be available on Science Museum websites for public access in the future.

Other ENRTF Appropriations Awarded in the Last Six Years

| Name | Appropriation | Amount Awarded |
|---|---|----------------|
| Mapping Unprofitable Cropland for Water and Wildlife | M.L. 2019, First Special Session, Chp. 4, Art. 2, Sec. 2, Subd. 04n | \$100,000 |
| Increased Intense Rain and Flooding in Minnesota's Watersheds | M.L. 2022, , Chp. 94, Art. , Sec. 2, Subd. 04h | \$192,000 |

Budget Summary

| Category / Name | Subcategory or Type | Description | Purpose | Gen. Ineligible | % Benefits | # FTE | Classified Staff? | \$ Amount |
|---------------------------------------|--------------------------------------|--|---------|-----------------|------------|-------|-------------------|------------------|
| Personnel | | | | | | | | |
| Assistant Scientist | | Project manager, primary modeler, analyst; developer of outreach/communication deliverables | | | 26% | 1.2 | | \$126,000 |
| Senior Scientist | | Lead sediment coring activities; assist and advise with modeling, analysis, development of outreach/communication deliverables | | | 26% | 0.14 | | \$22,300 |
| | | | | | | | Sub Total | \$148,300 |
| Contracts and Services | | | | | | | | |
| Greg Seitz, St. Croix 360 | Service Contract | Writing and publishing of project articles and other outreach content | | | | 0.2 | | \$15,000 |
| St. Croix Watershed Research Station | Internal services or fees (uncommon) | Sediment core collection and laboratory dating (6 cores: \$2550/core) | | | | 0 | | \$15,300 |
| St. Croix Watershed Research Station | Internal services or fees (uncommon) | Lab analysis of sediment core TP fractions (12 samples from 6 cores: \$1875/sample) | | | | - | | \$22,500 |
| St. Croix Watershed Research Station | Internal services or fees (uncommon) | Diatom analysis (8 samples from 6 cores: \$4800/sample) | | | | - | | \$38,400 |
| | | | | | | | Sub Total | \$91,200 |
| Equipment, Tools, and Supplies | | | | | | | | |
| | | | | | | | Sub Total | - |
| Capital Expenditures | | | | | | | | |
| | | | | | | | Sub Total | - |

| | | | | | | | | |
|-------------------------------------|---|--|--|--|--|--|--------------------|------------------|
| Acquisitions and Stewardship | | | | | | | | |
| | | | | | | | Sub Total | - |
| Travel In Minnesota | | | | | | | | |
| | Conference Registration Miles/ Meals/ Lodging | Two (1-person) conference registrations at two Minnesota environmental science conferences | Formal presentation of project results | | | | | \$500 |
| | | | | | | | Sub Total | \$500 |
| Travel Outside Minnesota | | | | | | | | |
| | | | | | | | Sub Total | - |
| Printing and Publication | | | | | | | | |
| | Publication | One peer-reviewed scientific paper published in open-access journals | To communicate our findings with researchers | | | | | \$3,000 |
| | | | | | | | Sub Total | \$3,000 |
| Other Expenses | | | | | | | | |
| | | | | | | | Sub Total | - |
| | | | | | | | Grand Total | \$243,000 |

Classified Staff or Generally Ineligible Expenses

| Category/Name | Subcategory or Type | Description | Justification Ineligible Expense or Classified Staff Request |
|---------------|---------------------|-------------|--|
|---------------|---------------------|-------------|--|

Non ENRTF Funds

| Category | Specific Source | Use | Status | \$ Amount |
|------------------|--------------------------|--|----------------------------|-----------------|
| State | | | | |
| | | | State Sub Total | - |
| Non-State | | | | |
| In-Kind | Science Museum of Museum | Support services from Science Museum of Minnesota 40.83% of direct costs | Secured | \$91,820 |
| | | | Non State Sub Total | \$91,820 |
| | | | Funds Total | \$91,820 |

Total Project Cost: \$334,820

This amount accurately reflects total project cost?

Yes

Attachments

Required Attachments

Visual Component

File: [3b850a09-056.pdf](#)

Alternate Text for Visual Component

Graphic showing photos of potential threats to the St. Croix River such as flooding, dam failures and toxic algae threats, and photos of valued St. Croix River resources such as camping, canoeing and endangered mussels....

Supplemental Attachments

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

| Title | File |
|--|-----------------------------------|
| Science of Minnesota Institutional Resolution Letter | 162cdd92-c59.pdf |
| 2025-144 Research Addendum revised_final | b1c922d5-ebe.docx |

Difference between Proposal and Work Plan

Describe changes from Proposal to Work Plan Stage

No changes other than (1) completion of Dissemination section and (2) error correction and re-upload of graphical visual component. Update 2/7/2025: A sentence added in A2 stating the Scenario Development Workshop will be held at the St. Croix Watershed Research Station; this will greatly reduce workshop costs (response to comment#6). Added ENRTF acknowledgement lang. in Dissemination section (response to comment#7). Responding to question regarding the need to possibly change A1 description to reflect changes in research addendum (e.g., "calibration") - no change is deemed necessary (response to comment#4). Note: will need to discuss further with staff the Service Contract "acknowledgement" for the Greg Seitz contract.

Additional Acknowledgements and Conditions:

The following are acknowledgements and conditions beyond those already included in the above workplan:

Do you understand and acknowledge the ENRTF repayment requirements if the use of capital equipment changes?

N/A

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?

Yes, I understand the Commissioner's Plan applies.

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?

Yes

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")?

No

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

Science Museum of Minnesota - St. Croix Watershed Research Station; National Park Service

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

Yes, I understand