



Environment and Natural Resources Trust Fund

M.L. 2026 Final Work Plan

General Information

ID Number: 2026-424

Staff Lead: Mike Campana

Date this document submitted to LCCMR: July 28, 2026

Project Title: Restoring Wild Rice Waters: Sulfate and Mercury Treatment

Project Budget: \$727,000

Project Manager Information

Name: Dave Holt

Organization: White Iron Chain of Lakes Association

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Web Address: www.wicola.org

Project Reporting

Reporting Schedule: April 1 / October 1 of each year.

Project Completion: June 30, 2029

Final Report Due Date: August 14, 2029

Legal Information

Legal Citation: M.L. 2026, Chp. 104, Sec. 2, Subd. 04n

Appropriation Language: \$727,000 the second year is from the trust fund to the commissioner of natural resources for an agreement with the White Iron Chain of Lakes Association to test a biological sulfate reduction system to treat sulfate and sequester mercury to improve the health of wild rice waters and aquatic ecosystems in northern Minnesota. Before costs for this appropriation are incurred, a fiscal agent for White Iron Chain of Lakes Association must be approved in the work plan.

Appropriation End Date: June 30, 2029

Narrative

Project Summary: This project tests a Biological Sulfate Reduction System (BSRS) to treat sulfate and sequester mercury, improving the health of wild rice waters and protecting aquatic ecosystems in northern Minnesota.

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

Sulfate contamination in northern Minnesota's waterways poses a significant environmental challenge, particularly impacting wild rice habitats. Wild rice, which thrives in low-sulfate waters, is vital for local ecosystems and culturally important to Native American communities. Elevated sulfate levels create toxic sulfides in sediment, harming wild rice growth, and contribute to the formation of methylmercury, a toxic substance that accumulates in fish, impacting both aquatic life and human health. This contamination degrades water quality, impairs lakes, and leads to fish consumption advisories, affecting local fishing and communities.

Agricultural and industrial activities are major contributors to sulfate pollution in the region. Despite ongoing concerns about water quality and human health, current treatment methods are neither efficient nor cost-effective for large-scale sulfate and mercury reduction.

Lab-scale testing has demonstrated success in reducing sulfate, but the scalability and mercury treatment of this technology have yet to be fully explored. Developing a scalable biological sulfate and mercury treatment solution presents a valuable opportunity to reduce contamination, protect wild rice habitats, improve water quality, and benefit ecosystems across northern Minnesota.

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.

This project will test a mobile Biological Sulfate Reducing System (BSRS) to address sulfate and mercury contamination in the Birch Lake watershed. The BSRS uses naturally-occurring, native microorganisms to convert sulfate into sulfide, which is then precipitated as iron and mercury sulfides and collected in a settling tank. This technology safely removes these contaminants from the environment using effective, cost-efficient, and environmentally-friendly biological processes.

The mobile unit will operate for 12 months at the Dunka River or a nearby water body starting in late 2026. Initially, the system will treat 1,200 gallons of water per day, with flow rates increasing to 5,000 gallons per day. Regular monitoring will track sulfate and mercury levels, along with other key operational parameters, to assess system performance and optimize its efficacy.

This pilot-scale project will test the BSRS technology for both mercury treatment and scalability to larger volumes. If successful, it could provide a sustainable, cost-effective solution for managing sulfate and mercury contamination across northern Minnesota. A successful treatment system will protect wild rice habitats, improve water quality, and reduce mercury levels, benefiting both the environment and local communities.

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 will contribute to the protection of Minnesota's natural resources by testing a developing technology designed to treat sulfate and mercury contamination in the Birch Lake watershed. The key outcome is the development and testing of a scalable solution for broader, regional sulfate and mercury treatment in northern Minnesota. This pilot project lays the groundwork for future large-scale applications that could provide significant wild rice habitat protection and improve water quality. Ultimately, the project contributes to the long-term environmental preservation of wild rice waters and aquatic ecosystems across the region.

Project Location

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

Region(s): NE

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

Region(s): NE

When will the work impact occur?

During the Project and In the Future

Activities and Milestones

Activity 1: Project Management and Financial Oversight

Activity Budget: \$134,000

Activity Description:

The objective of this activity is to ensure effective project management and financial oversight throughout the project. Initial tasks include completing the Site Safety and Health Plan (SSHP) and the Sampling and Analysis Plan (SAP). These documents will define experimental design, quality control and standard operating procedures (SOPs), evaluation criteria, and other design considerations to ensure robust data collection and safe, effective system operation. A risk mitigation component addressing environmental and operational considerations will also be included.

Ongoing progress reporting and communication with stakeholders will be maintained, and financial oversight will be managed through an external fiscal agent to handle budgeting, invoicing, and compliance with funding requirements.

This will be accomplished through regular team meetings, progress evaluations, and updates to stakeholders, along with ongoing budget reviews to ensure financial control. Key outcomes include the successful completion of required documents, continuous stakeholder engagement, and adherence to safety, regulatory, and financial standards. Evaluation will be done through performance reviews, financial audits, and progress assessments to ensure the project stays on schedule and within budget.

Activity Milestones:

Description	Approximate Completion Date
Signed Fiscal Agent agreement in place before ENRTF funding is used	July 31, 2026
Complete SSHP and SAP	August 31, 2026
Provide Ongoing Progress Reporting and Communication with Stakeholders	December 31, 2027
Manage Budgeting, Invoicing, and Financial Oversight Throughout Project	December 31, 2027

Activity 2: Planning, Installation, Setup, and Removal for Biological Sulfate Reduction System (BSRS) at Test Site

Activity Budget: \$47,500

Activity Description:

This activity involves the planning, installation, setup, and removal of the Biological Sulfate Reduction System (BSRS) at the designated test site. The process includes securing necessary permits, selecting an appropriate site in the Birch Lake watershed in collaboration with stakeholders, and ensuring all installation plans are reviewed and finalized. Once the testing phase concludes, the BSRS and associated equipment will be dismantled and removed, with site restoration as required. Planning operations will include attending stakeholder meetings, reviewing installation plans, and installing a power supply to ensure smooth operation.

The project will be planned and the site will be selected in coordination with property owners, local authorities, environmental regulators, and other stakeholders. Tribal and impacted community stakeholders will be formally engaged during planning to ensure their concerns are priorities are considered.

Activity Milestones:

Description	Approximate Completion Date
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Planning, Site Selection, Stakeholder Coordination, and Finalizing Installation Location	August 31, 2026
Complete Permit Applications, Submissions, and Approvals for Biological Sulfate Reduction System Installation and Operation	August 31, 2026
Install and Configure Biological Sulfate Reduction System and Associated Equipment at Test Site	September 30, 2026
Dismantle Biological Sulfate Reduction System and Restore Site Post-Testing Completion	November 30, 2027

Activity 3: Field Operations: Mobile System Testing for Optimization and System Efficacy Demonstration

Activity Budget: \$397,500

Activity Description:

This activity focuses on process testing and upscaling of the Biological Sulfate Reduction System (BSRS) to evaluate its performance under various flow rates and operational conditions. The objective is to optimize system efficiency and demonstrate its effectiveness for sulfate reduction and mercury sequestration. Key tasks include running system tests with different flow rates, adjusting operating parameters, and analyzing system performance to identify optimal conditions. Data will be collected on system efficiency, sulfate/sulfide and mercury/methylmercury reduction rates, and other water quality metrics required for technical and economic evaluations.

The system will operate for 8 to 12 months, with remote monitoring throughout the period. Routine staff visits will be conducted two to three times per week for inspections, testing, and maintenance. Analytical sampling, including river gaging and sampling, will occur biweekly. The system will treat between 1,200 to 5,000+ gallons per day through three treatment stages.

This activity will generate critical data to optimize the sulfate reduction system for larger-scale installations in northern Minnesota, aimed at treating sulfate discharges into wild rice waters. Insights from system performance will help refine the design, improve scalability, and ensure effective treatment of sulfate to protect sensitive ecosystems.

Activity Milestones:

Description	Approximate Completion Date
Initial Testing Phase - System Operations, Management, Engineering, and Analytical Sampling	January 31, 2027
Second Testing Phase - System Operations, Management, Engineering, and Analytical Sampling	May 31, 2027
Final Testing Phase - System Operations, Management, Engineering, and Analytical Sampling	September 30, 2027

Activity 4: Economic and Technical System Evaluations, Educational Outreach, and Dissemination of Results

Activity Budget: \$148,000

Activity Description:

This activity focuses on ongoing data evaluations, educational outreach, and supporting the economic and technical assessments of the project. The objective is to ensure transparency, engage stakeholders, and disseminate findings effectively. Key tasks include conducting continuous data evaluations, developing initial and final educational materials, and presenting results at community meetings. This activity will support the final reporting tasks which will include economic and technical evaluations to assess the system's performance, design concepts, and recommendations for full scale system implementation to protect aquatic ecosystems in Minnesota.

The outcomes will include an assessment of the system's effectiveness and potential for larger-scale applications to protect sensitive ecosystems. We will encourage third parties, including the public and other interested parties, to visit

the mobile test unit to learn about technology, collect samples, and confirm the results.

Ongoing project evaluations will involve gathering data from the system and feedback from stakeholders, and applying findings to improve system design for future protectiveness.

Activity Milestones:

Description	Approximate Completion Date
Complete Regular Permit Reporting (if applicable)	September 30, 2027
Evaluate Birch Lake Sulfate and Mercury Loading	November 30, 2027
Complete Final Report and Economic/Technical Evaluations	December 31, 2027
Develop Educational Materials for Stakeholders and the Community	December 31, 2027
Disseminate Results by Presenting at Community Meetings	December 31, 2027

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Jeff Hanson	Clearwater BioLogic	Clearwater BioLogic will lead the technical operation of the mobile test unit, supplying both the unit itself and the necessary operations and engineering staff. They will ensure proper installation, maintenance, and functionality, address challenges, assist with data evaluation, and oversee system setup and removal.	Yes
Jonna Spanier	Bay West	Bay West will provide field operations staff to conduct sampling, data management, and system evaluation. They will perform regular mobile unit and river sampling, support system operations, manage any necessary permits, and coordinate with teaming partners to prepare economic and technical evaluations of the system's performance.	Yes

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.

Educational materials will be developed at both the initial and final stages of the project to inform stakeholders and the public about the system's performance, design, and environmental impact. These materials will support outreach initiatives, including presentations at community meetings where project findings will be shared and discussed.

The Environment and Natural Resources Trust Fund will be acknowledged in all dissemination efforts through use of the trust fund logo and/or attribution language on project print and electronic media, publications, signage, and other communications per the ENRTF Acknowledgment Guidelines.

A mobile test unit, the primary component of this project, will provide a valuable platform for hands-on engagement. The public, researchers, and other third parties will be encouraged to visit the unit, observe system operations, collect samples, and independently validate results, enhancing credibility and community involvement.

Stakeholder feedback and data gathered throughout the project will inform continuous improvements to the system's design and future application. Final reporting will include technical and economic assessment reporting, as well as recommendations for large-scale implementation to protect sensitive aquatic ecosystems in Minnesota. One to two final conference presentations will take place at relevant local conferences in Minnesota.

These efforts aim to build trust, facilitate collaboration, and promote the broader adoption of innovative environmental technologies.

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?

The results of this pilot project will be disseminated to the public through educational materials, community meetings, and stakeholder engagement. WICOLA will ensure that the findings are accessible to all interested parties, including offering in-person visits to the mobile system to demonstrate how it works. Future applications of the technology will be pursued through state and federal grants, partnerships with environmental organizations, and collaboration with private industry. The goal is to scale the technology for broader use to protect wild rice waters and aquatic ecosystems.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
Personnel								
							Sub Total	-
Contracts and Services								
Clearwater BioLogic	Service Contract	Clearwater BioLogic will lead the technical operation of the mobile test unit, supplying both the unit itself and the necessary operations and engineering staff. They will ensure proper installation, maintenance, and functionality, address challenges, assist with data evaluation, and oversee system setup and removal.				3		\$348,000
Bay West	Service Contract	Bay West will provide field operations staff to conduct sampling, data management, and system evaluation. They will perform regular mobile unit and river sampling, support system operations, manage any necessary permits, and coordinate with teaming partners to prepare economic and technical evaluations of the system's performance.				1.72		\$234,000
RMB	Service Contract	Conduct laboratory analysis of sulfate, sulfide, mercury, and methylmercury throughout the project				0		\$55,000
Lake Soil and Water Conservation District	Service Contract	Lake SWCD is fiscal agent.		X		0.6		\$78,000
							Sub Total	\$715,000
Equipment, Tools, and Supplies								
	Tools and Supplies	Water Quality Sonde/Meter Calibration Supplies	Purchase instrument calibration and maintenance reagents and consumables (e.g., ORP solution, pH 4 standard solution).					\$1,000
							Sub Total	\$1,000
Capital Equipment								

		Water Quality Sonde/Meter	Purchase a water quality meter for continuous data collection and monitoring.	X				\$11,000
							Sub Total	\$11,000
Acquisitions and Stewardship								
							Sub Total	-
Travel In Minnesota								
							Sub Total	-
Travel Outside Minnesota								
							Sub Total	-
Printing and Publication								
							Sub Total	-
Other Expenses								
							Sub Total	-
							Grand Total	\$727,000

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
Contracts and Services - Lake Soil and Water Conservation District	Service Contract	Lake SWCD is fiscal agent.	The average billable rate is \$75 / hour compatible with rates determined by the Board of Water and Soil Resources (BWSR). Lake SWCD will be paid per BWSR rates. WICOLA doesn't have the fiscal strength to act as the payer for project expenses given the lag between payment and reimbursement.
Capital Equipment		Water Quality Sonde/Meter	This equipment is necessary and essential to the project for continuous data collection, monitoring, and troubleshooting of the mobile test unit. This equipment will be used to evaluate the effectiveness of the mobile test unit on a continuous basis during the 12-months of operation. Additional Explanation : After 12-months of continuous use, it is anticipated that this equipment will have a low but non-zero value at the end of this project. This equipment will continue to be used for sulfate remediation testing to improve water quality in Minnesota for the remainder of its useful life, else the residual value will be repaid to the ENRTF.

Non ENRTF Funds

Category	Specific Source	Use	Status	\$ Amount
State				
			State Sub Total	-
Non-State				
In-Kind	WICOLA	In-kind contribution of staff time for project management and senior evaluation team. This includes project management, stakeholder communication, community outreach, and distribution of educational materials.	Secured	\$135,000
In-Kind	Northern Lakes Scientific Advisory Panel	In-kind contribution of staff time for chemist data evaluations, technical and economic performance evaluations, and project support.	Secured	\$15,000
			Non State Sub Total	\$150,000
			Funds Total	\$150,000

Total Project Cost: \$877,000

This amount accurately reflects total project cost?

Yes

Attachments

Required Attachments

Visual Component

File: [11fb9a5f-f88.pdf](#)

Alternate Text for Visual Component

Clearwater BioLogic - Sulfate Reduction Process Flow Diagram and Mobile System...

Financial Capacity

Title	File
MN Certificate of Good Standing - WICOLA	f9f73262-df5.pdf
990N	c8314546-05e.pdf
2024 Financial End of Year Report	784f3005-da1.pdf

Board Resolution or Letter

Title	File
Lake SWCD Board Resolution Letter	8d820b39-1f8.pdf
WICOLA Board resolution 7-15-26	6be1b7d8-5a8.pdf

Supplemental Attachments

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

Title	File
Letter of Support_ MN Citizens	b1f4546d-dbe.docx
Letter of Support_ Bay West	99e4e86c-76a.pdf
Letter of Support_ MN Citizens2	4d32057b-e19.pdf
Letter of Support_ Clearwater BioLogic	2718c72a-354.pdf
Letter of Support_ U of M	feb46f4b-6f1.pdf
Letter of Support_ RNAS	79990f3d-603.pdf
Original WICOLA Authorization Letter	3fe5da71-4da.docx
2026-424 Research Addendum_Final	9b0c9c3f-800.docx

Difference between Proposal and Work Plan

Describe changes from Proposal to Work Plan Stage

We adjusted project budget to match LCCMR recommended funding of \$727,000.

We will send an email addressing the 2 questions on the prior page (Fiscal Agent & Intellectual Property)

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?

Yes

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?

N/A

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?

Yes, Lake County Soil and Water Conservation District

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:

Jeffrey Hanson - Clearwater BioLogic LLC; Brendan McShane - Bay West LLC

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