Environment and Natural Resources Trust Fund

2027 Request for Proposal

General Information

Proposal ID: 2027-191

Proposal Title: Expand Successful Upper Twin Results to the Chain

Project Manager Information

Name: Chuck Kendall

Organization: Twin Lake Association

Office Telephone: ( ) -

Email: chuckkendall68@gmail.com

Project Basic Information

Project Summary: To replicate the remarkable water quality improvement on Middle and Lower Twin Lakes that was achieved on Upper Twin Lake, during a three-year demonstration project utilizing a unique, innovative technology.

ENRTF Funds Requested: $449,000

Proposed Project Completion: July 31, 2028

LCCMR Funding Category: Water (B)

Project Location

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

Region(s): Metro

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

Region(s): Metro

When will the work impact occur?

During the Project and In the Future

Narrative

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

For decades, lakeshore property owners, local governments, and clean water advocates have been frustrated by the lack of viable remediation options to improve water quality in Minnesota's growing number of lakes impacted by excessive nutrient runoff.

Since 2022, Upper Twin Lake has participated in a highly successful demonstration project utilizing a unique and highly effective technology that may well serve as a solution to this ongoing problem. This initiative aims to determine whether Upper Twin Lake's success can be replicated throughout the Twin Lakes chain using the same technology.

Upper Twin Lake is a metropolitan waterbody at the head of a three-lake chain that includes Upper, Middle, and Lower Twin Lakes. It receives a high nutrient load (phosphorus) that contributes to significant periodic algae and cyanobacteria blooms, resulting in unpleasant odors, restricted recreational use, increased carp populations, and winter kills of game fish.

Upper Twin and Middle Twin Lakes are on the state-impaired waters list, while Lower Twin was removed in 2014. Prior to the demonstration project water improvements in 2023, the odor and algae on the lake often made it unpleasant for recreation. The demonstration project allows us to fish, swim, and embrace the lake all summer long.

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 proposed solution seeks to replicate the successful water quality improvements on Middle and Lower Twin Lake that were achieved on Upper Twin Lake via the demonstration project, using the same innovative technology.

As we understand it, the technology utilizes the well-established effects of the electrical double layer, which forms along charged surfaces (such as minerals and metals) in contact with a solvent (in this case, the solvent is water).

This causes a shift in the isoelectric point, which is the point where the positive and negative charges of the ions in the water are balanced. This shift increases the pH and dissolved oxygen levels in the water.

The Lake Association partnered with a vendor on the project that developed a patented system that enhances the double-layer effect, a process that further increases the pH and dissolved oxygen. The system induced these changes over a much larger volume of water, so a few properly placed units treated the entire lake. The increased pH causes the stable forms of carbon in the water to shift to a species of carbon ion that is less easily utilized for energy by algae and bacteria, reducing the lake's algae and bacteria.

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?

Specific project outcomes reflect the improvements already achieved through the demonstration project on Upper Twin Lake using no chemicals.

- Improved water clarity
- Elevated pH and dissolved oxygen levels
- Improved aquatic vegetation
- Enhanced fishing and reduced carp populations
- Three new bird species documented
- Greater wildlife diversity - Otters!
- Firmer bottom and decreased anoxic layer
- Improved aesthetics

We hope that utilizing the same technology on Middle Twin and Lower Twin Lake that was successful on Upper Twin Lake will replicate success on each lake in the chain, ultimately eliminating the need for weed harvesting while returning the chain to its natural state.

Activities and Milestones

Activity 1: Collect background information on the watershed and prepare the workplan

Activity Budget: $10,000

Activity Description:
Prepare a Work Plan

Collect all available data from past and ongoing studies on the Twin Lake watershed relative to water chemistry, alien invasive species (AIS), and native aquatic vegetation.

- Conduct an inspection of all influent and effluent water pathways using current and historical aerial photographs, groundwater studies, topographic maps, and field observations.
- Use current and historical aerial photographs to identify the areas of AIS growth and the phenology of the growth.
- Identify locations for the treatment units, focusing on access to electrical power, lake currents, the potential for lake vegetation to foul the intake screens, and observations during previous observations.
- Assess previous and current studies conducted by others along the watershed to identify potential areas for collaboration in sample collection and data sharing.
- Identify sampling stations and an analytical schedule.
- Compare the data gathered by others with data from previous studies to ensure that the project design will resolve any conflicts in analytical results and interpretation of data.
- Interview local residents to learn their concerns about the quality of life at the lake.

The resulting work plan will define goals, actions necessary to achieve those goals, a schedule for completion, and identify who will carry out the work.

Activity Milestones:

Description	Approximate Completion Date
Research previous work, identify middle and lower twin box locations, write workplan	July 31, 2026
Prepare workplan	July 31, 2026

Activity 2: Conduct Baseline Testing

Activity Budget: $12,526

Activity Description:
Baseline testing is essential for quantifying the initial water conditions, enabling the analysis of system performance, changes in water quality, and enhancing recreational benefits. The baseline testing will include Upper Twin, Middle Twin, and Lower Twin Lakes, as well as upstream influences and downstream locations to assess the system's effect.

Water quality monitoring will be conducted using three monitoring methods: an Aqua Troll AT500 multimeter (AT500), laboratory analyses, and Secchi disc readings.

The AT500 is equipped with a sonde that can measure up to 17 parameters. The key parameters that will be measured twice each month for this study include location, depth, temperature, pH, dissolved oxygen (DO), turbidity, and oxidation-reduction potential (ORP). The sonde is connected to a 30-foot cable, allowing for measurements at both the bottom and the surface. Secchi disc measurements will be taken during the AT500 sampling.

Water samples will be collected monthly for analyses by a laboratory licensed in Minnesota for orthophosphate, total phosphorus, nitrate, nitrite, biochemical oxygen demand, chemical oxygen demand, chlorophyll-α, total coliform bacteria, and Escherichia coli. These analytes align with the protocols of the Minnesota Pollution Control Agency.

Record field observations including weather, lake condition and color, and vegetation extent and activity.

Activity Milestones:

Description	Approximate Completion Date
Collect baseline samples,	July 31, 2026
Complete laboratory analyses	July 31, 2026
Enter data into MPCA database; design project database, enter data in project database	July 31, 2026

Activity 3: Install, operate, and maintain the system

Activity Budget: $106,500

Activity Description:
Each device is housed in a box with aluminum screening that filter out large debris and protect the system components from damage.

On Upper Twin Lake, two boxes will be installed on docks near the inlets at the northwest and northeast corners of the lake, and a third box will be placed on a dock 900 feet south of the northern units to improve water treatment on the wider (east) side of the lake. Box locations for middle and lower Twin Lakes will be placed at locations near the lake inlets and bays which have access to electricity. Electricity will be wired to the pump motor, and the pumps will undergo testing. The pumps will draw water from the lake, pump it through the unit, and discharge the treated water through a pipe extended downstream to prevent it from being recycled through the unit's intake.

Maintenance operations will occur twice a month. During these times, the intake will be inspected and cleaned, and the pumps will be repaired if necessary. The interiors components of the water treatment systems are not expected to require any repairs or maintenance.

Activity Milestones:

Description	Approximate Completion Date
Install treatment boxes, complete startup testing,	July 31, 2026
Prepare maintenance schedule	July 31, 2026

Activity 4: Monitor the Water Quality

Activity Budget: $201,800

Activity Description:
Water quality in the chain will be monitored twice a month using the AT500 and Secchi disc and record field observations as described in Action 2, above. Collect samples for laboratory testing. Prepare monthly progress reports. Enter data in MPCA and project databases.

Activity Milestones:

Description	Approximate Completion Date

Collect and analyze water samples, Secchi disc readings, monthly from July to September 2026	September 30, 2026
Collect and analyze water samples, Secchi disc readings, monthly from April to September 2027	September 30, 2027
Collect and analyze water samples, Secchi disc readings, monthly from April to July 2028	July 31, 2028

Activity 5: Monthly Summary

Activity Budget: $38,174

Activity Description:
A monthly summary will report on the work completed, results noted, trends in the data, if present, and any modifications that should be made to improve the efficiency or performance of the water improvement system. The summary will be distributed to the Upper Twin Lake Association and Lower Twin Lake Association leadership. Conduct two field trips per year to evaluate the progress and audit the sampling procedures and results. Recommend changes in the operation of the equipment to improve efficiency and results. Recommend changes in sampling procedures.

Activity Milestones:

Description	Approximate Completion Date
Collate data, enter into MPCA and project databases July to September 2026, prepare monthly report	October 31, 2026
Collate data, enter into MPCA and project databases April to September 2027, prepare monthly report	October 31, 2027
Collate data, enter into MPCA and project databases April to July 2028, prepare monthly report	July 31, 2028

Activity 6: Annual Report

Activity Budget: $21,000

Activity Description:
When the water improvement units have been removed from Upper Twin Lake, a report will be prepared that includes the following.

- The work accomplished
- A comparison of the work accomplished to the work planned and the reason for any deviations from the work plan
- The results of the work
- The conclusions that may be drawn based on the results of the work
- The extent to which the project met the goals defined in the workplan
- Recommendations for expanding, reducing, or eliminating any part of the work accomplished in subsequent years
- Recommendations for additions to the work for subsequent years
- Appendixes, which include figures, tables, photographs, copies of the AT500 and Secchi disc raw data, and the laboratory reports of analyses

Activity Milestones:

Description	Approximate Completion Date
Prepare 2026 annual report, circulate for comments, finalize report	November 30, 2026
Prepare 2027 annual report, circulate for comments, finalize report	November 30, 2027
Prepare 2028 annual report, circulate for comments, finalize report	July 31, 2028

Activity 7: Aquatic vegetation control

Activity Budget: $49,000

Activity Description:
Remove aquatic vegetation to provide access to monitoring areas and docks with treatment units. Prevent clogging of the intake pipes on the water treatment units.

Activity Milestones:

Description	Approximate Completion Date
Remove aquatic invasive species in 2026	August 31, 2026
Remove aquatic invasive species in 2027	August 31, 2027
Remove aquatic invasive species in 2028	July 31, 2028

Activity 8: Cyanobacteria toxicity screen

Activity Budget: $10,000

Activity Description:
Collect samples of water containing representative algae and cyanobacteria for a potentially toxigenic bacteria scan. If potentially toxigenic cyanobacteria are present, complete a follow-on analysis to determine the type of bacteria and the toxins present. The samples will be collected from Upper, Middle, and Lower Twin Lakes in June of 2026. It is anticipated that only Upper and Lower Twin will be sampled in 2027 and 2028.

Activity Milestones:

Description	Approximate Completion Date
Sample and analyze cyanobacteria for toxicity in July 2026	July 31, 2026
Sample Upper and Lower Twin Lakes and analyze for cyanobacteria in July 2027	July 31, 2027
Sample Upper and Lower Twin Lakes and analyze for cyanobacteria in July 2028	July 31, 2028

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
WQ3D	Innovative technology partner that is implementing a new water treatment technology that inhibits the reproduction cycle of cyanobacteria that has a limiting effect on algae growth in water bodies without chemical intervention.	Inventor of the technology used to significantly improve water quality on Upper Twin since 2022	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.
Our project will generate actionable data, field results, and implementation guidance on a new algae-inhibiting technology designed to significantly improve water quality in Minnesota lakes. To ensure broad awareness and long-term impact, we will share findings through multiple channels:

Technical reports summarizing performance, environmental outcomes, and recommendations will be provided to lake associations, watershed districts, tribal partners, state agencies, and local governments.

Public presentations at community meetings, conferences, and stakeholder workshops will ensure that entities who can benefit from the results are directly engaged.

Open-access data summaries will be posted online so Minnesotans can easily understand the project's outcomes and the environmental benefits achieved.

Implementation guidance will be developed to support adoption of the technology in additional lakes, promoting long-term improvements in water quality statewide.

Physical samples and documentation will be archived to ensure longevity of research products and future reference.

All outreach materials, reports, and digital communications will acknowledge the Environment and Natural Resources Trust Fund using the required ENRTF attribution language and logo. If ENRTF funds are used for dissemination activities—such as signage, public outreach materials, or publication fees—these efforts will be included in the project's Activities, Milestones, and Budget.

This dissemination strategy ensures that research results are accessible, actionable, and positioned to help additional Minnesota lakes prosper through improved water quality and reduced algal impacts.

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?

If this project achieves further success by replicating the accomplishments at Upper Twin on Middle and Lower Twin Lakes, the state will gain a new and effective tool to address a generational problem that has lacked a real solution in protecting its most valued resource. The Lessard-Sams Outdoor Heritage Fund is a potential source of ongoing and future funding for a treatment system that has been proven effective in managing algae, cyanobacteria, and phosphate loading. This results in enhanced recreational opportunities, better fishing, clearer and healthier water, increased native aquatic vegetation, and improved wildlife habitat.

Project Manager and Organization Qualifications

Project Manager Name: Chuck Kendall

Job Title: President, Twin Lakes Association.

Provide description of the project manager's qualifications to manage the proposed project.

The Twin Lakes Association achieved nonprofit status in 2024. The board is comprised of six members. Members must pay annual dues to have voting rights according to our by laws. The president of the Association is Chuck Kendall, who has been an environmental, health, and safety professional for 33 years working on large scale environmental projects including water and energy reduction, environmental remediation, environmental compliance, and stewardship projects funded by large Twin Cities companies in his background. He currently holds certified safety professional (ethics requirement) and certified environmental auditor status. His project management experience along with our financial controls enables our association to manage this project.

Organization: Twin Lake Association

Organization Description:

The Twin Lake Association is made up of community members and local partners who are dedicated to preserving and protecting the three-lake chain known as Upper, Middle and Lower Twin Lake. The Twin Lake chain is located in the cities of Crystal, Robbinsdale, and Brooklyn Center and is part of Shingle Creek Watershed.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	$ Amount
Personnel								
Project manager		Manage all overall operational functions and budget			0%	15		$34,000
							Sub Total	**$34,000**
Contracts and Services								
TBD - Watershed sampling	Service Contract	Water quality sampling to cover the entire watershed				33		$38,586
TBD - Subcontractor watershed sampling reporting	Service Contract	Report on the watershed sampling				12		$15,000
TBD	Service Contract	Contract aquatic vegetation management				12		$45,000
TBD	Service Contract	Installation, removal, maintenance, and operation of the treatment system				45		$98,000
TBD	Service Contract	Monitoring of the performance of the system, the effect on the water chemistry, and the degree to which the system controls the growth of algae and bacteria				81		$59,000
TBD	Service Contract	Preparation of workplan, monthly reports, and annual reports. Field inspections to verify the accuracy of the laboratory analyses, AT500 results, and Secchi disc readings. Quality control/quality assurance audits on the data. Entering data into the MPCA and project databases.				24		$38,500
TBD	Service Contract	Laboratory analyses of water samples				12		$38,400
TBD	Service Contract	Analyses of water samples to determine if toxigenic cycanbacteria are present.				0.3		$10,000
							Sub Total	**$342,486**

Equipment, Tools, and Supplies								
	Tools and Supplies	calibration, cleaning, and storage solutions for testing instruments; dissolved oxygen 7 liters, pH - 10 liters; oxidation reduction - 10 liters, conductivity - 8 liters	calibrate, clean, and store testing instruments					$1,500
							Sub Total	**$1,500**
Capital Equipment								
							Sub Total	**-**
Acquisitions and Stewardship								
							Sub Total	**-**
Travel In Minnesota								
	Miles/ Meals/ Lodging	mileage, boat, motor, trailer for monitoring - 2 people, 100 miles per trip, 14 trips per year, 3 years	Perform regular and periodic monitoring and necessary maintenance of water quality improvement devices.					$3,640
	Miles/ Meals/ Lodging	200 miles x 2 times per year x 3 years plus GSA rate per diem 4 days per year x 3 years x 2 people	install, test, and remove treatment units annually					$3,000
	Miles/ Meals/ Lodging	9 trips, 1 person,	identify treatment equipment locations, locate sampling points, quality control/quality assurance, audit sampling procedures, audit laboratory					$4,374
							Sub Total	**$11,014**
Travel Outside Minnesota								
							Sub Total	**-**
Printing and Publication								
							Sub Total	**-**
Other Expenses								

		Miscellaneous expenses	This amount will be held in reserve to address unforseen expenses such as changes in the analytical schedule or sampling frequency to assess unexpected changes in the lake chemistry					$30,000
		Electricity	Operate the treatment equipment for 3 years					$30,000
							Sub Total	**$60,000**
							Grand Total	**$449,000**

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				
Cash	National Fish and Wildlife Foundation Grant	Secured, 2026 - $60,000	Secured	$60,000
			Non State Sub Total	**$60,000**
			Funds Total	**$60,000**

Total Project Cost: $509,000

This amount accurately reflects total project cost?

Yes

Attachments

Required Attachments

Visual Component

File: 61f96c30-1a6.pdf

Alternate Text for Visual Component

Location of Upper, Middle, and Lower Twin Lakes in Brooklyn Center Crystal and Robbinsdale, Minnesota...

Financial Capacity

Title	File
Financial statement Twin Lake Association	889aad9c-2d9.docx

Board Resolution or Letter

Title	File
Board Resolution 2026	085f584e-089.docx

Supplemental Attachments

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

Title	File
Senator Pha letter of support from firsthand tour	46aa6525-029.pdf
Please view the before and after pictures showing algae kill and clear water	b0c1541e-93b.docx
Wildlife Bird Species Improvement due to better water quality	ad3e77c8-5f8.docx
Children's Hospice Supports Clean Water Project!	e04e8e7f-589.pdf
Senator Ann Rest Letter of Support	6d194891-e78.pdf
Financial State of Non-Profit Twin Lake	c6924056-4a4.xlsx
Board Resolution	588b9b39-897.docx
Table of Contents	22bce2eb-70d.docx

Administrative Use

Does your project include restoration or acquisition of land rights?

No

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?

No

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 proposal:

CJ Johnson and Dan Larson WQ3D

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