Environment and Natural Resources Trust Fund

M.L. 2025 Approved Work Plan

General Information

ID Number: 2025-064

Staff Lead: Michael Varien

Date this document submitted to LCCMR: June 9, 2025

Project Title: Training Lake Communities to Track Chloride and Algae

Project Budget: $274,000

Project Manager Information

Name: Hilarie Sorensen

Organization: U of MN - Duluth - Sea Grant

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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. 04d

Appropriation Language: $274,000 the first year is from the trust fund to the Board of Regents of the University of Minnesota for the Minnesota Sea Grant college program in Duluth to develop and train a network of community-based volunteers to track chloride and harmful algal blooms in rural Minnesota lakes.

Appropriation End Date: June 30, 2028

Narrative

Project Summary: Minnesota Sea Grant and partners will coordinate a network of community-based volunteers to track chloride and harmful algal blooms in lakes to understand these emerging environmental and public health problems.

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

Two major threats to the health of Minnesota lakes are chloride from road salt and water softeners and harmful algal blooms (HABs) from nutrient influx. Chloride and the nutrients responsible for producing HABs enter lakes through runoff and inadequately maintained septic systems. Both problems can degrade water quality and harm aquatic ecosystems, and HABs pose health risks to humans, pets, livestock, and wildlife.

These two problems are particularly challenging to track because runoff events that bring chloride and nutrients into lakes don't have a single-point source and are episodic, making chloride influxes and HAB occurrences unpredictable. As a result, we have a poor understanding of 1) when and where chloride influxes and HABs will occur, 2) how chloride moves within a lake, 3) why the frequency of HABs is increasing over time, and 4) what types of algae and toxins are present in blooms.

This lack of understanding is exacerbated by a lack of capacity of natural resource staff to be on-site to collect samples during an unexpected chloride influx or HAB occurrence, especially in rural Minnesota lakes. To address the issues of chloride and HABs, this project creates a broader surveillance network across lakes over time.

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 seeks to improve understanding of the timing, location, and distribution of chloride and HABs in rural Minnesota lakes. To achieve this, we will use community-based participatory science to establish a collaborative volunteer network to track chloride levels and HABs in local lakes.

Data collected by volunteers, and verified by professionals will be used to improve the understanding of the timing, location, and distribution of chloride and HABs. To develop this community-based monitoring network, the project team led by Minnesota Sea Grant and the Natural Resources Research Institute will partner with Soil and Water Conservation Districts, lake associations, and other lake-based communities to conduct late-spring to early-summer chloride sampling and late-summer to early-fall HAB sampling.

The project team will provide community volunteers with comprehensive training on how to collect water samples and provide the equipment to collect data on chloride levels and HABs. We will develop and distribute educational materials, host webinars, and facilitate in-person gatherings to share information on HABs, chloride pathways to lakes, and water sampling and analysis techniques. Through this integrated approach, we aim to foster long-term community engagement, knowledge exchange, and solutions for protecting Minnesota lakes.

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?

The primary outcome of this project is the creation of a sustained, community-based network of trained volunteers to monitor chloride levels and HABs in rural Minnesota lakes. Success will be measured by volunteer recruitment and retention, number of lakes sampled, and water samples submitted for analysis. This network will enhance understanding of chloride and HAB dynamics and guide future monitoring efforts by natural resource agencies. Additional outcomes include a web-based data portal for information sharing, extension education and outreach programs, and a final project report and peer-reviewed publication to raise awareness and promote mitigation strategies for these lake stresses.

Project Location

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

Region(s): NE, NW, Central,

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

Statewide

When will the work impact occur?

During the Project and In the Future

Activities and Milestones

Activity 1: Establish a network of community-based volunteers and develop comprehensive training materials for monitoring chloride levels and HABs in Minnesota lakes.

Activity Budget: $97,912

Activity Description:
The project team will partner with Soil and Water Conservation Districts, lake associations, and other lake-based communities to recruit volunteers for a community-based participatory science network that will detect episodic chloride influxes and HABs in Minnesota lakes. We will develop chloride and algae bloom sampling kits and protocols for volunteers, and build a web-based interactive data portal for information exchange between volunteers and project partners. We will create a video series to share science-based information about chloride and HABs in rural Minnesota lakes and provide training for volunteers on water sampling techniques. We will attend in-person gatherings with volunteers at lake association seasonal meetings and events where we will share project information and distribute water sampling kits to detect high chloride levels and emergent HABs in rural Minnesota lakes.

Activity Milestones:

Description	Approximate Completion Date
Develop sampling protocols and conduct in-person and virtual trainings for all recruited volunteers	April 30, 2026
Launch a user-friendly, web-based portal for real-time data sharing and volunteer-project team information exchange	April 30, 2026
Collaborate with partners to recruit at least 20 volunteers for the 2026 lake monitoring season	April 30, 2026
Volunteers collect water samples and enter lake data into the online data portal	October 31, 2026
Conduct 2026 chloride concentration and cyanotoxin analysis and share results with volunteers and project partners	October 31, 2026

Activity 2: Community-based volunteers will analyze water samples for chloride levels and HABs and send additional samples to scientists for analysis

Activity Budget: $104,550

Activity Description:
The project team will coordinate with community-based volunteers to collect chloride and HABs samples from their local lakes. Volunteers will use salinity meters to measure surface-water salt levels on-site and collect water samples for analysis of chloride concentrations at the University of Minnesota Duluth (UMD) Large Lakes Observatory. Chloride concentrations in water samples will be measured using an ion-selective electrode method.

Volunteers will use USB handheld field microscopes to capture images of HABs. These images will be uploaded to the project's data portal for algae identification at the UMD Natural Resources Research Institute (NRRI). Volunteers will use test-strip kits to detect the presence of microcystin, a cyanobacteria toxin. If microcystins are detected, volunteers will freeze and send water samples to NRRI for further analysis.

Before analysis, samples will be prepared at NRRI by undergoing three freeze-thaw cycles or using a commercially available QuikLyse kit. Microcystin concentrations will be analyzed using Abraxis Enzyme-Linked Immunosorbent Assay (ELISA) plates on an automated Gold Standard Diagnostics CAAS Cube instrument, which is the most advanced cyanobacteria toxin monitoring instrument in Minnesota.

We will maintain active engagement with volunteers throughout the data collection and analysis process.

Activity Milestones:

Description	Approximate Completion Date
Retain 2026 volunteers and recruit additional participants to double volunteer base for the 2027 season	April 30, 2027
Volunteers collect water samples and enter lake data into the online data portal	October 31, 2027
Conduct 2027 chloride and cyanotoxin analysis and share results with volunteers and project partners	October 31, 2027
Host two seasonal outreach events in 2027 to share monitoring progress and engage volunteers	October 31, 2027

Activity 3: Develop public education and outreach programs on chloride and HABs in rural Minnesota lakes and conduct project evaluation and reporting.

Activity Budget: $71,538

Activity Description:

The project team will synthesize the results from the community-based volunteer-collected lake data, laboratory analysis, and data interpretation on chloride levels and HABs over the two years of sampling during this project. This information will be used to better understand where and when high chloride concentrations and toxic HABs are likely to occur and subsequently to develop recommendations for monitoring strategies to better track these threats in rural Minnesota lakes. We will develop public education and outreach programs and materials about chloride and HABs in Minnesota lakes and share strategies for mitigating the runoff which carries chloride and nutrients into lakes that lead to elevated chloride levels and HABs. Outreach materials will include fact sheets, story maps, articles, short videos, infographics, social media posts, and media relations. We will continue to engage with volunteers and expand the community-based volunteer network through the use and distribution of outreach materials and related activities. We will conduct a project evaluation and develop a final project report.

Activity Milestones:

Description	Approximate Completion Date
Host five seasonal community events during project to engage volunteers and share progress and findings	June 30, 2028
Complete and submit final report detailing volunteer engagement, sampling methods, results, and project outcomes	June 30, 2028
Conduct evaluation to assess sampling methods, community engagement, and volunteer learning outcomes	June 30, 2028
Submit at least one peer-reviewed journal article based on project findings and recommendations	June 30, 2028

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Christopher Filstrup	U of MN - Duluth - NRRI	Filstrup leads NRRI's Lake and Stream Ecosystem Ecology Laboratory along with the Central Analytical Lab and has 20+ years experience studying cyanobacteria blooms. He will lead cyanobacteria toxin analysis and will assist with data analyses, project reporting, and engaging with project partners.	Yes
Kaela Natwora & Becca Reiss	North St. Louis County Soil & Water Conservation District	North St. Louis County SWCD will assist the project team with identifying and recruiting community-based volunteers, distributing sampling kits, and training volunteers. Also, the SWCD will provide guidance on community engagement approaches and recommendations for future community-based volunteer monitoring programs.	No
Ilena Hansel	Cook County Soil & Water Conservation District	Cook County SWCD will assist the project team with identifying and recruiting community-based volunteers, distributing sampling kits, and training volunteers. Also, the SWCD will provide guidance on community engagement approaches and recommendations for future community-based volunteer monitoring programs.	No
Stephanie Kessler	Itasca Coalition of Lake Associations	Itasca Coalition of Lake Associations will serve as one of our community-based volunteer communities and will assist with sample collection and sample analysis. Also, ICOLA will participate in knowledge sharing events with the project team and will provide feedback on project engagement to improve future engagement with volunteers.	No
Kathy Cone	Itasca Waters	Itasca Waters will assist the project team with identifying and recruiting community-based volunteers, distributing sampling kits, and training volunteers. Also, Itasca Waters will provide guidance on community engagement approaches and recommendations for future community-based volunteer monitoring programs.	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.
We will collaborate with partners at the UMD Natural Resources Research Institute, soil and water conservation districts, and other state natural resource management organizations to develop sampling protocols for chloride and algae blooms. These protocols will be tailored for lake-based community volunteers. We will also compile and distribute sampling kits and conduct training sessions via webinars and in-person gatherings with lake associations and other lake-based communities.

To facilitate data management and information sharing, we will create a web-based interactive data portal hosted by the Natural Resources Research Institute. This portal will manage data collected by volunteers and enable communication between volunteers and project partners. The project team will use the data portal to share results from the analysis of submitted water samples, including chloride concentrations, algae bloom identification, and toxin analysis. A long-term data sharing and preservation plan will ensure that data remains publicly accessible beyond the project's duration. All data will be deposited into the Data Repository for the University of Minnesota (DRUM) (http://hdl.handle.net/11299/166578) within two years of the project's conclusion and will be shared with NOAA partners.

We will coordinate with the Minnesota Sea Grant communications team to manage media inquiries and share project updates and outcomes through various channels, including newsletter articles, fact sheets, infographics, story maps, and social media. Additionally, we will present project updates and findings at local, regional, and state events and conferences. A final accessible report summarizing the project's processes and results will be distributed to project

partners and lake communities via electronic means, published on the University Digital Conservancy, and posted on the Minnesota Sea Grant website (seagrant.umn.edu). Any additional final products generated from this project will also be accessible through these channels.

We will acknowledge the Environmental and Natural Resources Trust Fund (ENRTF) by using the trust fund logo or attribution language on all project print and electronic media, publications, signage, and other communications and outreach materials, in accordance with the ENRTF Acknowledgement Guidelines.

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?

Education and outreach materials developed during this project will be publicly available through the Minnesota Sea Grant website. The project seeks to foster a long-term network of community-based participatory scientists trained to track chloride levels and HABs in rural Minnesota lakes that will expand over time, for which we will seek additional funding. This participatory-volunteer network will help improve understanding of chloride and HAB dynamics in lakes and inform future chloride and HAB monitoring efforts by natural resource agencies. This project will foster enduring partnerships among Minnesota Sea Grant, the Natural Resources Research Institute, lake-based communities, and natural resource managers.

Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
Catch and Reveal: Discovering Unknown Fish Contamination Threats	M.L. 2022, , Chp. 94, Art. , Sec. 2, Subd. 04g	$246,000

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	$ Amount
Personnel								
Hilarie Sorensen, Principal Investigator		Serve as the project manager to coordinate the development of water sampling protocols, training webinars, facilitate in-person gatherings, recruit volunteers, lead the chloride analysis and data interpretation, develop education and outreach programs and materials and conduct project evaluation and reporting.			27%	0.75		$75,297
Chris Filstrup, Co-Investigator		Responsible for leading the cyanotoxin analysis and data interpretation at the UMD Natural Resources Research Institute and will assist with engaging and training volunteers and project reporting.			27%	0.24		$30,765
Jane Reed, Database Developer		Responsible for developing a web-based portal for volunteer-collected data entry and management			27%	0.18		$9,927
Elizabeth Alexson, Aquatic Ecologist		Responsible for algae identification from volunteer submitted photographs at the UMD Natural Resources Research Institute			27%	0.18		$17,896
Eva Hendrickson, Water Quality Analyst		Responsible for analyzing water samples for microcystin toxin concentrations at the UMD Natural Resources Research Institute, including sample preparation and analysis, data analysis, and project reporting.			25%	0.3		$18,591
Two Undergraduate Research Assistants		Responsible for analyzing water samples for chloride concentrations at the UMD Large Lakes Observatory including sample preparation and analysis, data analysis and interpretation, and project reporting.			0%	0.39		$19,692
							Sub Total	**$172,168**
Contracts and Services								
							Sub Total	-

Equipment, Tools, and Supplies								
	Tools and Supplies	40 Lake Sampling Kits for Volunteers	We will supply volunteers with lake sampling kits to measure chloride levels, photograph harmful algal blooms, and collect water samples to send to UMD for additional analysis. Sampling kits will include: water sample collection bottles, gloves, Rite in the Rain notebooks, USB digital microscopes, salinity meters, coolers, ice packs, and microcystins test strips.					$33,090
	Tools and Supplies	Chloride analysis laboratory supplies	Lab supplies to analyze chloride concentrations in water samples collected by volunteers. Supplies will include: a pH/ISE Electrode and meter, reagents, pipettes, glassware, parafilm, gloves, and Kim (disposable) wipes.					$4,363
	Tools and Supplies	Harmful algal bloom analysis	Lab supplies to prepare and process cyanobacteria toxin samples. Supplies will include bottles, storage vials, filters, standards, and 32 Abraxis Enzyme-Linked Immunosorbent Assay (ELISA) kits.					$30,194
							Sub Total	**$67,647**
Capital Expenditures								
							Sub Total	**-**
Acquisitions and Stewardship								
							Sub Total	**-**
Travel In Minnesota								
	Miles/ Meals/ Lodging	UMD fleet rental ($62/day x 12 days), Mileage: 1284 miles/year at rate of $0.18, per diem for 3 individuals at $69/day x 12 days, lodging for 3 individuals at $150 per night x 6 nights.	Project personnel to travel to soil and water conservations districts and lake associations to share project information, recruit volunteers,					$22,300

			distribute sampling kits, and offer education and outreach on chloride and HABs in rural Minnesota lakes.					
							Sub Total	**$22,300**
Travel Outside Minnesota								
							Sub Total	**-**
Printing and Publication								
	Printing	Fact sheets, flyers, posters, infographics, data sheets, sampling protocols	Public outreach materials					$1,545
							Sub Total	**$1,545**
Other Expenses								
		Shipping	Courier/Mailing services for volunteers to send water samples to UMD for lab analysis					$10,340
							Sub Total	**$10,340**
							Grand Total	**$274,000**

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	UMN unrecovered indirect costs are calculated at the UMN federally negotiated rate for research of 55% modified total direct costs	Indirect costs are those costs incurred for common or joint objectives that cannot be readily identified with a specific sponsored program or institutional activity. Examples include utilities, building maintenance, clerical salaries, and general supplies.	Secured	$151,800
			Non State Sub Total	**$151,800**
			Funds Total	**$151,800**

Total Project Cost: $425,800

This amount accurately reflects total project cost?

Yes

Attachments

Required Attachments

Visual Component

File: bae4d8df-53e.pdf

Alternate Text for Visual Component

A map of Minnesota with people representing lake-based communities with dotted lines connecting them to UMDs Minnesota Sea Grant and Natural Resources Research Institute. On either side of the map are images including a Harmful Algal Bloom, a salinity meter in a lake, and a microscope looking at a sample....

Supplemental Attachments

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

Title	File
North St. Louis County SWCD support letter	f2c339dd-74c.pdf
Cook County SWCD support letter	7225f3ca-540.pdf
Itasca Coalition of Lake Associations support letter	b9cbeb8d-364.pdf
Itasca Waters support letter	02e2e619-bd2.pdf
University of Minnesota Duluth Transmittal Letter	a93a26f8-cae.pdf

Difference between Proposal and Work Plan

Describe changes from Proposal to Work Plan Stage

We reviewed all proposal information and modified the budget to ensure it aligns with the recommended funding amount of $274,000. We updated the project location using the new drop-down options, reviewed the status reporting schedule, and added the dissemination plan. On January 31, 2025 we reviewed the comments and revisions and made the corresponding edits in the general information and narrative sections. On May 8, 2025 we addressed the recommended revisions to our project milestones to better align with our project outcomes.

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 UMN Policy on travel 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 project:

University of Minnesota Duluth

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

N/A