Environment and Natural Resources Trust Fund

M.L. 2026 Draft Work Plan

General Information

ID Number: 2026-248

Staff Lead: Michael Varien

Date this document submitted to LCCMR: October 29, 2025

Project Title: PFAS and Microplastics: Potential Impacts of Environmental Co-Occurrence

Project Budget: $721,000

Project Manager Information

Name: David Duffey

Organization: Minnesota Pollution Control Agency

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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:

Appropriation Language:

Appropriation End Date: June 30, 2029

Narrative

Project Summary: Analyze water, sediment, and fish for PFAS and microplastics to determine whether co-occurrence has an impact on bioaccumulation.

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

Microplastics and per- and polyfluoroalkyl substances (PFAS) are both, individually, ubiquitous in the environment and known to disrupt human health. Better understanding their co-occurrence could lead to advancements to protect human health and the environment, but this has been scarcely-researched. This leaves a gap in the knowledge of potential impacts to the environment and human health. For example, if the presence of microplastics leads to increased accumulation of PFAS in fish tissue, people who eat fish collected in waters with high levels of microplastics could be exposed to even more PFAS compared to consuming fish from waters with less microplastic pollution. We seek to sample water, sediment, and fish for both of these contaminants to determine if fish in waters with roughly the same concentration of PFAS in surface water and sediment will have higher concentrations of PFAS in their tissues, because 1) some microplastics are PFAS (e.g. polyvinyl fluoride) and 2) microplastics are known to attract PFAS.

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.

Up to 154 total samples (surface water, sediment, and fish, combined) will be collected from up to 7 Minnesota lakes and analyzed for a targeted list of 40 PFAS. A subset of 35 samples (a combination of fish, sediment, and water) will also be analyzed for a larger suite of PFAS using non-targeted (suspect screening methods) as described in the section on sample analysis. From each lake, one fish per species (2 fish per lake) with the highest concentration of Σ40PFAS (sum of 40 PFAS measured by laboratory method 1633) based on the targeted analysis will be selected for non-targeted PFAS analysis (14 fish total). In addition, one sediment sample and one surface water sample with the highest Σ40PFAS from each lake will be selected for non-targeted PFAS analysis (7 sediment and 7 surface water samples, total). Additional samples (up to 7) may be selected for non-targeted PFAS analysis based on targeted PFAS and MP analysis.

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 research will help us identify and address concerns related to PFAS and microplastics in Minnesota's environment. Specifically, it will address the need for a field-based study of PFAS and MPs and how they interact in the aquatic environment. By analyzing each contaminant from one sample (i.e. analyzing for both PFAS and microplastics from one fish, one sediment, or one water sample) we will be able to identify what impacts, if any, are present when they're found together. Understanding this relationship between microplastics and PFAS accumulation will help us target water, fish, and human health protection efforts.

Project Location

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

Statewide

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: PFAS Analysis

Activity Budget: $319,500

Activity Description:
Analyze up to 154 samples of water, sediment, and fish tissue from target locations using established methods to determine PFAS concentrations in each.

The laboratory at the University of Minnesota - Duluth will perform target analysis of the 40 PFAS analytes included in US EPA standard method 1633 for up to 154 water, sediment, and fish tissue samples. Additional non-target (suspect screening) analysis will be performed for a subset of up to 35 extracts initially generated for target analysis (i.e., analysis will be performed on existing extracts, such that additional extractions will not be required). Suspect screening analysis will be performed to screen for up to 2000 known or suspected PFAS analytes using a SCIEX liquid chromatography coupled to a X500R QTOF system to better understand PFAS precursors fate, transport and bioaccumulation from the environment to fish.

Activity Milestones:

Description	Approximate Completion Date
Assist with collection of water and sediment samples as necessary	January 31, 2028
Analyze up to 154 samples for 40 PFAS	June 30, 2028
Analyze up to 35 samples for PFAS using non-targeted methods	June 30, 2028
Participate in data interpretation	January 31, 2029
Manuscript Submitted for Peer Review	June 30, 2029

Activity 2: Microplastics Analysis

Activity Budget: $197,000

Activity Description:
The laboratory at the University of Minnesota - Duluth will handle and analyze up to 154 water, sediment, and fish samples for microplastics greater than 100um in size using a Bruker Lumos II micro Fourier Transform Infrared (FTIR) microscope. Surface water samples, collected via 100 um Manta net, will be processed via Fenton oxidation and density separation. Surface sediment samples collected by ponar grab and processed separately. Fish fillets and gut contents will be processed separately for each fish using enzymatic degradation with additional Fenton oxidation if necessary. Method blanks and positive control samples for each sampling and processing procedure will also be analyzed. The microplastics concentrations (count/L, count per fish, count/kg dry mass) will be compared by project partners with PFAS concentrations in samples collected at the same time and in the same location.

Activity Milestones:

Description	Approximate Completion Date
Analyze up to 154 samples for Microplastics	June 30, 2028
Participate in data interpretation	January 31, 2029
Manuscript Submitted for Peer Review	June 30, 2029

Activity 3: PFAS and Microplastics Sampling

Activity Budget: $194,000

Activity Description:
A total of 7 Minnesota lakes will be selected for PFAS and MP sampling. Existing PFAS fish tissue data held by the Minnesota Pollution Control Agency (MPCA) will be used to assign lakes to a PFAS category (low, moderate, or high). "Low" PFAS waters will have an average PFOS fish tissue concentration <10 ng/g wet weight (ww). "Moderate" PFAS waters will have an average PFOS fish tissue concentration between 10 ng/g ww and 20 ng/g ww. "High" PFAS lakes will have an average PFOS fish tissue concentration >20 ng/g ww. These thresholds align with Minnesota Department of Health (MDH) fish consumption guidance thresholds for sensitive populations (MDH 2024). Two low PFAS waters, three moderate PFAS waters, and two high PFAS waters will be selected for testing.

In addition, waters with existing microplastics data will be prioritized for sampling so that we can build our understanding of MP and PFAS co-occurrence at these sites.

All samples will be collected by a Contractor selected through the State of Minnesota's competitive request for proposals (RFP) process. The contractor selected to complete sampling will follow all sampling precaution protocol provided by the MPCA and UMD.

Activity Milestones:

Description	Approximate Completion Date
Create RFP for Contractor Selection	August 31, 2026
Contractor Selected and Awarded	April 30, 2027
Sampling Complete. Contractor Deliverable (samples delivered to laboratory) Received.	January 31, 2028

Activity 4: In-state Travel

Activity Budget: $3,000

Activity Description:
In-state travel to conference(s) to present results

Activity Milestones:

Description	Approximate Completion Date
In-state conference attendance and presentation	June 30, 2029

Activity 5: Data Analysis and Dissemination

Activity Budget: $7,500

Activity Description:
Project partners from the MPCA and UMD will use targeted PFAS concentration data in surface water, sediment, whole fish, and fish fillet to calculate bioaccumulation factors (BAFs) for each species in each lake (both whole fish and fillet). We will compare the microplastics and PFAS results from whole fish analysis with the results in fillet (PFAS and MP) and gut contents (MP) to try to discern correlations between gut and fillet microplastics contents with PFAS and microplastics tissue distribution. We will also consider the potential for ecological risk using surface water, sediment, and whole fish results, as well as potential human health risk using fillet results.

Statistics platforms like MS Excel, R, and MATLAB will be utilized to interpret and visualize data. The complete results of the study including non-targeted analysis will be submitted for peer-reviewed publication to a journal such as Environmental Science and Technology. Results will be presented at relevant scientific conferences. Data and publication

will also be available via communications release from the MPCA and University of Minnesota - Duluth.

All presentations, publications, and communications (electronic or printed) will acknowledge ENTRF by using the logo or language provided in ENTRF acknowledgement guidance.

Activity Milestones:

Description	Approximate Completion Date
Publication in open-access journal	June 30, 2029

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Summer Streets	MPCA	Research Scientist supporting PFAS analysis	No
Dr. Bridget Ulrich	University of Minnesota - Duluth	Overseeing laboratory analysis and interpretation of environmental samples for PFAS	Yes
Dr. Liz Minor	University of Minnesota - Duluth	Overseeing laboratory analysis and interpretation of environmental samples for microplastics.	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.
The complete results of the study including non-targeted analysis will be submitted for peer-reviewed publication to a journal such as Environmental Science and Technology. Results will be presented at relevant scientific conferences. Data and publication will also be available via communications release from the MPCA and University of Minnesota - Duluth.

All presentations, publications, and communications (electronic or printed) will acknowledge ENTRF by using the logo or language provided in ENTRF acknowledgement guidance.

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?
Results will support the MPCA strategic goals to:
- Reduce direct exposures to known pollutants, including their cumulative impacts.
- Identify and address impacts from pollutants that are creating human exposures from contaminated sites.
- Reduce levels of high priority pollutants.

Results will support goal three of Minnesota's PFAS Monitoring Plan which states: "Gather data that galvanizes support for PFAS source reduction and pollution prevention."

This is a one-time study. No ongoing efforts are expected at this time.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	$ Amount
Personnel								
							Sub Total	**-**
Contracts and Services								
University of Minnesota - Duluth	Subaward	UMD Ulrich Lab: Personnel - $250,836 Travel - $3,000 Services - $21,450 Supplies - $30,000 Other (Graduate student) - $23,714 UMD Minor Lab: Personnel - $131,673 Services - $20,000 Supplies - $35,327 Other (Shipping) - $1,000				7.32		$517,000
Contractor (TBD after request for proposal and competitive bid process)	Service Contract	Collect samples of water, sediment and fish for PFAS and microplastics analysis. Costs will include personnel, equipment for sample collection, processing and storage, travel and any justifiable, directly-related, eligible expenses encountered.				0		$190,000
							Sub Total	**$707,000**
Equipment, Tools, and Supplies								
	Tools and Supplies	Field consumables (nitrile gloves, bottles, coolers, labels, etc...)	Equipment necessary for sample collection					$3,500
							Sub Total	**$3,500**
Capital Expenditures								
							Sub Total	**-**

Acquisitions and Stewardship								
							Sub Total	**-**
Travel In Minnesota								
	Conference Registration Miles/ Meals/ Lodging	Conference registration (in-person or virtual)	Presentation of results					$3,000
							Sub Total	**$3,000**
Travel Outside Minnesota								
							Sub Total	**-**
Printing and Publication								
	Publication	Publication in peer-reviewed journal(s)	Publication in an open-access journal to disseminate findings to wider scientific audience					$7,500
							Sub Total	**$7,500**
Other Expenses								
							Sub Total	**-**
							Grand Total	**$721,000**

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				
In-Kind	MPCA staff time equivalent to 0.55 FTE per study year	MPCA staff time	Secured	$222,750
			State Sub Total	**$222,750**
Non-State				
In-Kind	University of Minnesota - Duluth	UMN unrecovered indirect costs are calculated at the UMN negotiated rate for research of 54% 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. (https://research.umn.edu/units/oca/fa-costs/direct-indirect-costs)	Secured	$284,196
			Non State Sub Total	**$284,196**
			Funds Total	**$506,946**

Total Project Cost: $1,227,946

This amount accurately reflects total project cost?

Yes

Attachments

Required Attachments

Visual Component

File: 243cce22-f2b.docx

Alternate Text for Visual Component

Word document containing a cartoon illustration of PFAS and microplastics in water, sediment, and fish....

Supplemental Attachments

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

Title	File
United States Geological Survey photo of Neuston net for microplastics sampling	210cb2fb-0af.jpe
UMD Ulrich Lab Budget	e8de9efa-91f.docx
UMD Minor Lab Budget	278214e6-fce.docx

Difference between Proposal and Work Plan

Describe changes from Proposal to Work Plan Stage

No substantial changes to outcomes were made between the proposal and draft work plan. However, in order to match the dollar amount awarded by the committee the number of samples to be collected was reduced. This, in turn, reduced the analytical costs as well as the estimate needed for subcontractors and tools/equipment. Additionally, an estimate for travel within the state was reduced. Project milestones were not altered as a result of these changes.

10/8/2025 - Subaward description was summarized as completely as possible in space allowed.

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:

Summer Streets - Minnesota Pollution Control Agency

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