

**Environment and Natural Resources Trust Fund**

# M.L. 2025 Final Work Plan

## **General Information**

**ID Number:** 2025-080

**Staff Lead:** Michael Varien

**Date this document submitted to LCCMR:** June 11, 2025

**Project Title:** Pine Needles Reveal Past and Present Airborne PFAS

**Project Budget:** $550,000

## **Project Manager Information**

**Name:** Summer Streets

**Organization:** Minnesota Pollution Control Agency

**Office Telephone:** (651) 757-2761

**Email:** summer.streets@state.mn.us

**Web Address:** https://www.pca.state.mn.us/

## **Project Reporting**

**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. 07c

**Appropriation Language:** $550,000 the first year is from the trust fund to the commissioner of the Pollution Control Agency to use current and historic pine needles as a low-cost method to assess statewide per- and polyfluoroalkyl substances (PFAS) levels in ambient air.

**Appropriation End Date:** June 30, 2028

## **Narrative**

**Project Summary:** Pine needles are great passive air samplers because their waxy outer layer attracts airborne pollutants. Pine needles will be used to assess airborne PFAS in current and historic pine needles.

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

PFAS has become one of the most pressing environmental issues in Minnesota. MPCA and sister agencies are expending considerable resources to monitor, assess, and control PFAS in the state. Widespread, ongoing monitoring of surface water, groundwater, and fish are now part of our regular work at the agency. Ambient air remains our least-studied environmental media leaving us with a huge PFAS data gap. Understanding PFAS in ambient air is critical to our understanding of PFAS fate, transport, and exposure.

Ambient air monitoring for organic contaminants like PFAS is difficult, expensive, and subject to several limitations. For example, a high-volume air monitor is standard equipment for collecting ambient air samples. High-volume air monitors require a fenced area with electricity, trained staff to manage sample media and run the monitor, and expensive media preparation and analyses that are available at very few laboratories. These limitations mean that a large portion of our state (especially places where we don’t have existing air monitoring stations) cannot be monitored for PFAS in air using traditional sampling techniques.

**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.**

Pine needles provide an opportunity to test atmospheric PFAS that is cost-effective and limited only by the presence or absence of pine trees. Pine needles are ideal passive samplers because:

• They have waxy, lipid-rich cuticles that facilitate sorption of airborne organic pollutants like PFAS,
• It is easy to identify the current year’s growth of needles, making it possible to assess current atmospheric conditions,
• Collecting and analyzing is inexpensive, especially when compared with the cost and limitations of using the high-volume air samplers required for PFAS sampling,
• Pine needles capture both long-range and local PFAS, giving a total picture of PFAS in ambient air,
• And pines grow in the most remote areas of the state, making air testing possible in areas where it is not possible to place a monitor.

In addition, using pine needles to assess a wide variety of organic contaminants in air, including PFAS has proven effective and efficient in several studies.

Minnesota's unique resources are advantageous for this type of study. Minnesota has pine throughout the state. We also have a volunteer network at the ready, a contracted laboratory with excellent analytical capabilities, and an herbarium with a vast collection of pine needles dating back to 1875.

**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?**

Pine needle analysis for PFAS will provide the state with a large amount of ambient airborne PFAS data. Data will be used to:
• Assess current PFAS ambient air conditions, statewide.
• Estimate ambient anthropogenic “background” PFAS conditions in air.
• Identify “hot spots” potentially associated with local sources, which may spur further investigations and source identification.
• Increase our understanding of PFAS presence, fate, transport, and exposure, especially in the most remote parts of the state where data are currently lacking.
• Estimate PFAS deposition to surface waters as a means of understanding fish contamination when no other source can be identified.

## **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: Selection and Analysis of Historic Pine Needle Samples**

**Activity Budget:** $78,750

**Activity Description:**Up to 30 archived pine needle samples will be selected from UMN Bell Museum Herbarium. Sample selection will focus on samples collected in Washington, Ramsey, and Dakota counties. Samples dating back to the late 1800s/early 1900s prior to the advent of PFAS production will be selected to serve as reference samples. Beginning with samples collected in the 1940s onwards (PFAS production era), 1 – 2 samples will be selected for analysis per decade, up to the year 2020. A subset of samples from greater Minnesota will also be analyzed and will serve as additional reference samples.

Upon selection, all samples will be shipped to Eurofins for non-targeted PFAS analysis. Non-targeted analysis (NTA) provides semi-quantitative data for over 1,000 PFAS, which can be used to assess changes in PFAS production and regional differences in PFAS congener patterns.

**Activity Milestones:**

|  |  |
| --- | --- |
| **Description** | **Approximate Completion Date** |
| Historic Sample Selection | July 31, 2025 |
| Non-targeted PFAS analysis of historic samples by Eurofins | July 31, 2026 |

### **Activity 2: Statewide Collection and Targeted Analysis of Current and Historic Pine Needle Samples**

**Activity Budget:** $466,250

**Activity Description:**Current-year pine needles will be collected by these volunteers at no cost to the state of Minnesota. Our goal is to collect 3 samples in each of Minnesota’s 87 counties, including the most remote parts of the state. A total of 313 targeted analyses will be performed as follows: 261 current-year needles, 26 duplicate needle samples, and 26 aqueous QA/QC samples.

Up to 10 historic needles samples will also be analyzed using targeted methods.

The project manager will work with the Volunteer Monitoring Coordinators to develop training for PFAS sample collection with our volunteer network. Training will include video and written materials, including a frequently asked question (FAQ) guide. The collection procedure is relatively simple, and our volunteers are already skilled sample collectors.

Upon completion of training, volunteers will receive a sample collection kit including everything needed to collect pine needle samples, including nitrile gloves, Ziploc bags, and other supplies. Volunteers will collect the sample according to protocol and promptly submit the samples to Eurofins for analysis.

All pine needles will be shipped to Eurofins for PFAS analysis. Current pine needles will be analyzed by Eurofins using targeted methods (EPA 537 modified + 5 FTOHs) to measure 75 total PFAS.

**Activity Milestones:**

|  |  |
| --- | --- |
| **Description** | **Approximate Completion Date** |
| Purchase sampling supplies | July 31, 2025 |
| Volunteer recruitment | August 31, 2025 |
| Develop and share sample collection training | September 30, 2025 |
| Send collection kits to volunteers who have completed training | September 30, 2025 |
| Volunteers collect current-year samples | December 31, 2025 |
| Targeted PFAS analysis by Eurofins | May 31, 2026 |

### **Activity 3: In-state Travel**

**Activity Budget:** $2,000

**Activity Description:**Travel to UMN Herbarium for sample selection and present results at in-state conferences

**Activity Milestones:**

|  |  |
| --- | --- |
| **Description** | **Approximate Completion Date** |
| One trip to UMN Herbarium to select samples | July 31, 2025 |
| In-state conference attendance and presentation | June 30, 2027 |

### **Activity 4: Dissemination**

**Activity Budget:** $3,000

**Activity Description:**Current year data collected by our volunteers will be exported to a publicly-accessible, interactive Tableau map. This will allow volunteers to see “their” data and compare their results to the entire statewide dataset. Volunteers will be offered a webinar via WebEx where they can learn more about the meaning and importance of the data they helped collect. Instructions will be provided for accessing and interpreting the map. The map will be made available to the public on MPCA’s website, along with a description of the project and guidance for interpreting the data, which may include video as well as written guidance.

The complete results of the study, including non-targeted analysis and modeling results, 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 will also be shared with the National Atmospheric Deposition Program (NADP). NADP established a PFAS deposition monitoring network in 2024 after several years of development and testing.

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** |
| Volunteer webinar | May 31, 2027 |
| Publication in open-access journal | June 30, 2027 |
| Tableau map | June 30, 2027 |
| NADP data sharing | June 30, 2027 |

## **Project Partners and Collaborators**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Organization** | **Role** | **Receiving Funds** |
| Eurofins | Eurofins Environment Testing LLC | PFAS analysis in pine needles | Yes |
| Timothy Whitfled | University of Minnesota Bell Museum Herbarium | Provide access to archived pine needle samples for PFAS analysis | No |

## **Dissemination**

**Describe your plans for dissemination, presentation, documentation, or sharing of data, results, samples, physical collections, and other products and how they will follow ENRTF Acknowledgement Requirements and Guidelines.**Study findings will be submitted to an open-access peer-reviewed journal for publication. Results will also be shared at scientific conferences and made available on MPCA's website. All articles, presentations, webinars, and communications (electronic and print) on this project will acknowledge ENTRF using either the ENTRF logo or appropriate acknowledgement language according to ENTRF Acknowledgement Guidelines.

An interactive data map will be publicly available on MPCA's website.

A webinar will be offered to volunteers at the completion of the study. A presentation of the data, conclusions, and how to access the interactive map will be provided.

If any "hot spots" should be identified, an effort will be made to identify possible sources and MPCA's Compliance and Enforcement team will be promptly notified.

## **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 Minnesota’s PFAS Monitoring Plan. The goals of the monitoring plan are to:
1. Gather Minnesota-specific information in order to craft effective policies around PFAS and their incorporation into MPCA programs;
2. Identify areas of particular concern (due to PFAS concentrations or routes of exposure) that need quick action; and
3. Gather data that galvanizes support for PFAS source reduction and pollution prevention.
The data collected in this study will be supportive of all 3 goals.

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

## **Other ENRTF Appropriations Awarded in the Last Six Years**

|  |  |  |
| --- | --- | --- |
| **Name** | **Appropriation** | **Amount Awarded** |
| Developing Strategies To Manage PFAS In Land-Applied Biosolids | M.L. 2021, First Special Session, Chp. 6, Art. 5, Sec. 2, Subd. 04d | $1,404,000 |

## **Budget Summary**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Category / Name** | **Subcategory or Type** | **Description** | **Purpose** | **Gen. Ineli gible** | **% Bene fits** | **# FTE** | **Class ified Staff?** | **$ Amount** |
| **Personnel** |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  | **Sub Total** | **-** |
| **Contracts and Services** |  |  |  |  |  |  |  |  |
| Eurofins Environment Testing | Service Contract | Targeted analysis of PFAS |  |  |  | 0 |  | $461,250 |
| Eurofins Environment Testing | Service Contract | Non-targeted analysis of PFAS |  |  |  | 0 |  | $78,750 |
|  |  |  |  |  |  |  | **Sub Total** | **$540,000** |
| **Equipment, Tools, and Supplies** |  |  |  |  |  |  |  |  |
|  | Tools and Supplies | Nitrile gloves, Ziploc bags, coolers, other sampling supplies including shipping | Sample collection materials |  |  |  |  | $5,000 |
|  |  |  |  |  |  |  | **Sub Total** | **$5,000** |
| **Capital Expenditures** |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  | **Sub Total** | **-** |
| **Acquisitions and Stewardship** |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  | **Sub Total** | **-** |
| **Travel In Minnesota** |  |  |  |  |  |  |  |  |
|  | Miles/ Meals/ Lodging | One trip to UMN Herbarium from outstate Minnesota | Acquisition of historic pine needle samples |  |  |  |  | $300 |
|  | Conference Registration Miles/ Meals/ Lodging | Conference registration (virtual) | Presentation of results |  |  |  |  | $1,700 |
|  |  |  |  |  |  |  | **Sub Total** | **$2,000** |
| **Travel Outside Minnesota** |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  | **Sub Total** | **-** |
| **Printing and Publication** |  |  |  |  |  |  |  |  |
|  | Publication | Open Access Journal Fee | Required fee for publication in open access journal |  |  |  |  | $3,000 |
|  |  |  |  |  |  |  | **Sub Total** | **$3,000** |
| **Other Expenses** |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  | **Sub Total** | **-** |
|  |  |  |  |  |  |  | **Grand Total** | **$550,000** |

### **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 0.5 FTE per study year | MPCA staff time | Secured | $135,000 |
|  |  |  | **State Sub Total** | **$135,000** |
| **Non-State** |  |  |  |  |
|  |  |  | **Non State Sub Total** | **-** |
|  |  |  | **Funds Total** | **$135,000** |

**Total Project Cost: $685,000**

**This amount accurately reflects total project cost?**
 Yes

## **Attachments**

### **Required Attachments**

#### ***Visual Component***

File: [cb8be545-011.pdf](https://lccmrprojectmgmt.leg.mn/media/map/cb8be545-011.pdf)

#### ***Alternate Text for Visual Component***

PFAS emitted to the atmosphere adheres to pine needles, where it can be measured to assess past and present PFAS contamination....

### **Supplemental Attachments**

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

|  |  |
| --- | --- |
| **Title** | **File** |
| 2025-080 Research Addendum revised\_final | [49103eb9-e43.docx](https://lccmrprojectmgmt.leg.mn/media/attachments/49103eb9-e43.docx) |

## **Difference between Proposal and Work Plan**

#### ***Describe changes from Proposal to Work Plan Stage***

Adjustments were made to the number of samples to be collected and analyzed because the appropriations was a bit less than the amount requested.

## **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:**

 Alexis Donath, MPCA

**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