



Environment and Natural Resources Trust Fund

M.L. 2023 Approved Work Plan

General Information

ID Number: 2023-101

Staff Lead: Mike Campana

Date this document submitted to LCCMR: May 26, 2023

Project Title: Completing Installment of the Minnesota Ecological Monitoring Network

Project Budget: \$1,094,000

Project Manager Information

Name: Holly Bernardo

Organization: MN DNR - Ecological and Water Resources Division

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Project Reporting

Date Work Plan Approved by LCCMR: June 22, 2023

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

Project Completion: June 30, 2026

Final Report Due Date: August 14, 2026

Legal Information

Legal Citation: M.L. 2023, Chp. 60, Art. 2, Sec. 2, Subd. 07c

Appropriation Language: \$1,094,000 the first year is from the trust fund to the commissioner of natural resources to improve conservation and management of Minnesota's native forests, wetlands, and grasslands by completing the Ecological Monitoring Network to measure ecosystems' change through time.

Appropriation End Date: June 30, 2026

Narrative

Project Summary: The Ecological Monitoring Network will install up to 185 final plots. Data are needed to understand climate change impacts in Minnesota and identify resilient natural lands for conservation or enhancement.

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

The Ecological Monitoring Network is Minnesota's first, and only, state-wide monitoring project collecting statistically rigorous data on native biodiversity. Most of the existing data collected on Minnesota's native plant communities were collected for the purpose of documenting where they occur across our state, as well as quality and abundance; not for understanding how they were changing over time. Data collected from the monitoring network will help us understand and quantify how a broad range of native plant communities are adapting in response to multiple stressors including climate change, an increased frequency of extreme weather events, and the spread of invasive species. This in turn will inform resilient and sustainable conservation and enhancement practices in light of climate change. MN Climate Action Framework's Initiative 2.2 specifically recognizes conserving and enhancing native biodiversity as critical to adapt to climate change. Furthermore, this network includes all landownerships - another step toward engaging all Minnesotans in our effort to mitigate and adapt to climate change.

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 proposal will install up to 185 final plots, for a total of 500 random and up to 50 targeted plots throughout the state. This entire plot network will provide scientifically rigorous statewide data for analyses and reports to inform ongoing management and conservation questions, in particular long-term strategies for enhancing the climate adaptation potential of Minnesota's natural lands. Each plot provides data on native plant biodiversity and threats such as invasive species specific to that native plant community that are immediately useful to the landowner to inform conservation decisions. The final network, though intended to be long term, will provide immediate information useful to informing landscape level goals and priorities. For example, identifying hotspots of invasive plant species across Minnesota, describe the relationship between invasive earthworm infestation and native plant biodiversity, and describe the relationship between deer browse and tree regeneration. The established plots will provide a foundation for academic researchers or other collaborators to expand on the base data. As the network is re-sampled over time (on a 7–8-year cycle), the data become more powerful in their ability to quantify how Minnesota's native plant communities are changing in response to the continued stressors created by climate.

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?

Monitoring at temporal and geographic scales such as this are critical for assessing changes in our natural resources. For example, data may highlight how warming temperatures are influencing tree regeneration in our forests or how increased droughts are impacting wetlands throughout the state. The ENRTF has already supported the first two-thirds of this project's initial investment and this final installment would establish a vast statewide network of plots providing the State of Minnesota with a scientifically rigorous statewide dataset for making science-based decisions for sustainably conserving and enhancing resilient natural lands for the benefit of all Minnesotans into the future.

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: Finalize Network with up to 185 New Plots

Activity Budget: \$919,000

Activity Description:

Add up to 185 new plots to the existing network completed from previous appropriations. Our current ML21 appropriation will conclude June 30, 2024. As planned, this appropriation will support all plots installed starting in 2024. A pool of 20,000 random plot locations were generated across the State of MN during project development supported by our ML16 appropriation. Those locations were chosen using a spatially balanced design. A small subset of locations are drawn from that pool annually, and if permission is obtained, installed in the next field season. After those 500 random plots are completed, we will install up to 50 targeted plots placed to fill geographic or plant community gaps in the network. Data will be collected using protocols developed and tested in the ML16 and ML21 appropriations. Briefly, a plot consists of three 45-meter parallel transects. Canopy and subcanopy tree species and coarse woody debris are counted. The percent cover of ground layer plant species and the presence/absence of deer browse are recorded. In grasslands, structure is measure using a Visual Obstruction Reading. In wetlands, water chemistry is measured via pH, conductivity and temperature. Plant collections will be processed and delivered to the UMN for accession.

Activity Milestones:

Description	Approximate Completion Date
Data collection and new plot establishment completed for approx. 90 monitoring plots	September 30, 2024
2024 field season data entered into the EMN Database and quality checked	April 30, 2025
Data collection and new plot establishment completed for approx. 90 monitoring plots	September 30, 2025
2025 field season data entered into the EMN Database and quality checked	April 30, 2026
Preparation and submission of specimens	June 30, 2026

Activity 2: Data Distribution, Education and Outreach

Activity Budget: \$175,000

Activity Description:

All results will be published on the DNR Ecological Monitoring Network website. Annual summaries including individual site data will be sent to the landowners or managers of the land where each site is located. A written report that examines of the first round of data from the completed network will be created and disseminated to stakeholders. This report will summarize the variation in biodiversity and threats to native plant communities across Minnesota. We will also gather and analyze potential covariates, for example local weather, landscape context, and current and historical land use. Those analyses will provide comprehensive, foundational information for future comparison as the network is resampled into the future. Presentations to nonprofit organizations, natural resource managers, and universities will be made to inform audiences of monitoring results and recruit other researchers to build upon the network. Specific outreach efforts will be made to distribute the summary report to other stakeholders.

Activity Milestones:

Description	Approximate Completion Date
Annual summary reports distributed to landowners or managers after 2024 field season	February 28, 2025
Annual summary reports distributed to landowners or managers after 2025 field season	February 28, 2026
Summary report using plots installed through the 2025 will be written and distributed to stakeholders.	June 30, 2026
Conduct public outreach and technical guidance activities.	June 30, 2026

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Division of Forestry	MN DNR	Help with initial project objectives, providing help with land access, staffing in the field.	No
Division of Parks and Trails	MN DNR	Help with initial project objectives and study design, providing help with land access, staffing in the field.	No
Division of Wildlife	MN DNR	Help with initial project objectives and study design, providing help with land access, staffing in the field.	No
The Nature Conservancy	The Nature Conservancy	Help with initial project objectives and study design, access to land and providing help with land access, staffing in the field, potential collaboration with additional research at plots on their land.	No
College of Food, Agricultural and Natural Resource Sciences	University of Minnesota	Staff, primarily within the Department of Forest Resources helped with original study design and objectives. We see potential for future research or statistical analysis collaboration on monitoring plots. Data collection on lichens and mosses has already begun at a select number of our plots by U of MN researchers.	No
US Fish and Wildlife Service	Dept of the Interior	Helped with initial study design and objectives, assistance with land access and permits, potential future partner for additional research on plots placed on their land.	No
US Forest Service	Department of Agriculture	Helped with initial study design and objectives, assistance with land access and permits, potential collaborator on future additional research on plots within their ownership.	No
National Park Service	Department of the Interior	Consultation on initial project objectives and study design.	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.

All of the information on the web page for this project will be continually updated, including revised brochures, revisions to the Standard Operating Procedures, and information from data analyses. The web site address is:

<https://www.dnr.state.mn.us/mbs/ecologicalmonitoring/index.html>

Reports summarizing data collected in each plot will continue to be sent to the respective landowner or land manager for each plot following each field season. PowerPoint presentations will be revised and presented at a number of venues to make natural resource managers, scientists, and the general public aware of project outcomes and its long term importance.

The Minnesota Environment and Natural Resources Trust Fund (ENRTF) will be acknowledged through use of the trust fund logo or attribution language on project print and electronic media, publications, signage, and other communications per 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?

The DNR is actively developing long-term cooperative funding for sustaining this Ecological Monitoring Network over

time. Resampling plots will take considerably less time and resources compared to initial installation, and will be incorporated into the work of the DNR MBS Program.

Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
Statewide Monitoring Network for Changing Habitats in Minnesota	M.L. 2016, Chp. 186, Sec. 2, Subd. 03d	\$500,000
Expanding Minnesota Ecological Monitoring Network	M.L. 2021, First Special Session, Chp. 6, Art. 5, Sec. 2, Subd. 03b	\$800,000

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
Personnel								
Plant Ecologist / Botanists – Int. & Sr.		Vegetation data collection, synthesis, planning and leading field plot installation.			28%	4		\$372,982
Plant Ecologist / Botanist		Support for in-field plot installation and vegetation data collection			27%	3.8		\$235,000
Interns		Seasonal field support for plot installation			0%	1.5		\$60,000
Project Manager		Project records and document management, landowner and partner coordination, project business management			28%	0.4		\$30,000
Information Outreach Specialist		Maintain project website, data outreach, posting updated reports and materials			30%	0.4		\$45,000
Plant Ecologist / Botanist		Support for in-field plot installation and vegetation data collection		X	27%	0.2	X	\$30,000
							Sub Total	\$772,982
Contracts and Services								
Field Botanist(s)	Professional or Technical Service Contract	Contracting with a field botanist(s) with advanced plant identification skills to help install plots				0.8		\$150,000
							Sub Total	\$150,000
Equipment, Tools, and Supplies								
	Equipment	Field equipment will be reused from previous projects to the extent possible. Additional supplies needed may include meter tapes, waterproof notebooks, insect/tick repellent, safety vests; plot marking supplies such as rebar, magnets and magnetized nails, tree tags; measuring tools such as	Necessary for either marking the plots permanently, collecting data or specimens					\$15,000

		tree calipers, rulers, water chemistry meters and calibration supplies, pvc pipes for marking plots in wetlands, compasses, GPS receivers; plant specimen collecting and preservation supplies. No capital expenditures (over \$5,000 for a single item) will be purchased.						
							Sub Total	\$15,000
Capital Expenditures								
							Sub Total	-
Acquisitions and Stewardship								
							Sub Total	-
Travel In Minnesota								
	Miles/ Meals/ Lodging	Travel for three 3-person crews for 2 field seasons to install and sample monitoring plots; 200 field days, 30,000 miles. Vehicles (\$14,100), lodging (\$54,000), and meals (\$6,600) in accordance with the Commissioner's Plan.	Each team will require one vehicle (3 total) for the summer to access plots across the state; Each team will need access to lodging/hotels while in transit during the week; and reimbursement for meals while in transit.					\$74,697
							Sub Total	\$74,697
Travel Outside Minnesota								
							Sub Total	-
Printing and Publication								
							Sub Total	-
Other Expenses								
		Direct and necessary costs to cover HR support (\$18,777), Safety Support (\$3,784), Financial Support (\$13,589), Communication Support (\$1,811), IT Support (\$42,341), and Planning Support (\$1,020).	These funds are needed to pay other DNR personnel for things like HR and IT.					\$81,321

							Sub Total	\$81,321
							Grand Total	\$1,094,000

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
Personnel - Plant Ecologist / Botanist		Support for in-field plot installation and vegetation data collection	<p>Classified Position</p> <p>Classified : The classified staff do not have EMN in their normal work plan or funding. Their normal funding is restricted to certain uses which do not include EMN. Their normal work will be delayed or eliminated while they work on EMN. The classified staff have specific expertise that make them uniquely valuable to assist with EMN.</p>

Non ENRTF Funds

Category	Specific Source	Use	Status	\$ Amount
State				
Cash	Heritage Enhancement Fund	Funds the Research Scientist/Coordinator (Lead for the project), as well as other staff support	Pending	\$300,000
Cash	General Fund dollars	Supervision, project oversight, guidance and other staff support	Pending	\$50,000
			State Sub Total	\$350,000
Non-State				
Cash	Federal State Wildlife Grant appropriations	Much of the proposed ENRTF funds qualify as State match for these appropriations.	Pending	\$100,000
			Non State Sub Total	\$100,000
			Funds Total	\$450,000

Attachments

Required Attachments

Visual Component

File: [f30bd43f-682.pdf](#)

Alternate Text for Visual Component

Statewide map showing the location of plots already established from past appropriations, future plots with 2023 appropriation, and a depiction of what the plot layout looks like on the ground....

Optional Attachments

Support Letter, Photos, Media, Other

Title	File
Background Check	16e7591d-a6e.pdf

Difference between Proposal and Work Plan

Describe changes from Proposal to Work Plan Stage

- 1 - Project Manager information was changed to reflect the new Project Manager (Holly Bernardo)
- 2 - One project location item was changed; 'When will the work impact occur?' was changed to 'During the project and In the future'
- 3 - The total budget was reduced to \$1,094,00. This reduction was achieved by reducing Activity 1 to a total of \$994,000 via removing 0.5FTE over the course of the grant (less \$62,018 in salary and less \$3,982 in D&N). At our original budget, each plot was estimated to cost \$4,240. This reduction equates to about 15 plots. Thus, the expected deliverable for Activity 1 was reduced to 235 plots. This edit was changed in numerous places through out.
- 4 - An error in the completion date for 'Annual summary reports distributed to landowners or managers after each field season' was corrected. It was changed from February 28, 2025 to February 28, 2026 to include the last field season.
- 5 - A completed background check certification form was attached.
- 6 - A description of the planned dissemination efforts was added.
- 7 - A statement that no capital expenditures will be purchased was added.
- 8 - The requested detail on plot selection and methods were added.
- 9 - The requested intermediate milestones were added. They were revised to call out plot establishment and data collection and revised to include the contingency that plot establishment for Activity 1 may require field work into June in 2026. That would likely depend on the transition from ML21 to ML23. Follow up data activities for those plots would be supported by other funding sources.

My apologies for the glitch. The text about methods and plot selection has been added in again to the description of Activity #1.

Added estimated FTE's supported under contracts.

Final Work Plan changes

- The text was changed through out to reflect a new target plot total, 500-550, with this grant supporting up to 185 new plots. This change is a result of a new, recent statistical analysis we conducted that further refined sample size needs. This included removing two milestones for plot installation in summer 2026.
- A missing milestone was re-added (2025 field season data entered into the EMN Database and quality checked).
- Activity 1 budget was reduced by \$75,000 because of the reduced plot total.

- Activity 2 budget was increase by \$75,000 and the final report product plans were expanded to shift those resources for best use.
- A line was added for classified plant ecologist / botanist staff (total 0.2 FTE), and the line for unclassified plant ecologist / botanist staff was reduced by 0.2 FTE. \$30,000 was moved from the unclassified line into the classified line. See justification provided for classified staff.
- No changes were needed to the project location or reporting schedule. Dissemination information had already been entered. There were no comments to address.

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 agree travel expenses must 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 agree to the Commissioner's Plan.

Does your project have potential for royalties, copyrights, patents, or sale of products and assets?

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