



Environment and Natural Resources Trust Fund

2027 Request for Proposal

General Information

Proposal ID: 2027-130

Proposal Title: Concordia College Bat Monitoring Project

Project Manager Information

Name: Darin Ulness

Organization: Concordia College

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Project Basic Information

Project Summary: Deploy a network of AudioMoth recording devices across the Moorhead metro to map bat activity, support white-nose syndrome recovery monitoring, and engage residents as Citizen Scientists.

ENRTF Funds Requested: \$255,000

Proposed Project Completion: June 30, 2030

LCCMR Funding Category: Small Projects (G)

Secondary Category: Fish and Wildlife (D)

Project Location

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

Region(s): NW

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

Narrative

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

Minnesota bats provide major natural resource benefits by consuming insects and supporting healthy ecosystems, yet their populations and habitat use are changing rapidly under pressures that include white-nose syndrome, urban growth, and shifting climate and land use. Often monitoring in Minnesota has focused on forested regions and a limited number of sites, leaving a key gap in understanding bat activity within urban and suburban landscapes where people live, manage parks, and make infrastructure decisions. Moorhead sits at an important ecological crossroads of a river corridor, restored tallgrass prairie, residential neighborhoods, parks, and agricultural edges. This likely creates fine-scale patterns in bat activity and species presence. It is difficult for conservationists to identify activity hotspots, assess seasonal timing, track year-to-year change, or design community actions that support bat conservation with high resolution monitoring. AudioMoths collect very high quality at around one-tenth the cost of traditional bioacoustic devices. Furthermore, bats are often misunderstood so there is a need to educate the public on the importance of bats to our ecosystem. Citizen Science projects are high impact ways of generating strong public interest and leveraging the fact that many residents want meaningful ways to contribute to conservation science.

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.

We will deploy and operate a 100 to 125 device network of ultrasonic AudioMoth recorders across the Moorhead city limits (along with several small rural control groups). This will be done throughout the bat-active season to paint a picture of bat activity in cities like Moorhead. Moorhead residents will be invited to participate as Citizen Scientists. Tiered participation options for residents will be available ranging from simply offering ones yard to actively working with Concordia College students and faculty to collect and analyze data. Field teams will follow standardized deployment protocols, retrieve recordings on a regular schedule, and maintain device performance. We will process recordings using an already established workflow that rapidly separates bat from non-bat sound and supports subsequent species-level interpretation when feasible, producing quality-controlled indices of activity and, where appropriate, species presence. We will generate maps and seasonal summaries that identify hotspots, timing of activity, and variability across sites and months. We will engage community members and educators through on-campus workshops and web-based access to selected recordings and translated, human-audible bat audio, allowing participants to connect with bats in their own neighborhoods. Project results will be fully open any scientist/organization worldwide.

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 project will produce a high-quality, season-long dataset of bat acoustic activity for the Moorhead area; publicly accessible maps and summaries of spatial hotspots and seasonal timing; a technical report and curated data package for resource managers and researchers; and a documented field and data-processing protocol suitable for replication in other Minnesota communities. The project will train undergraduate researchers in wildlife monitoring and data analysis, and it will engage residents and K-12 partners through device-hosting opportunities, workshops, and online listening and visualization tools. These outcomes will help support conservation of Minnesota's bat populations and their habitats.

Activities and Milestones

Activity 1: Acoustic bat monitoring throughout the city of Moorhead, MN

Activity Budget: \$255,000

Activity Description:

Activity 1 will deploy and operate a high-density acoustic bat monitoring network in the Moorhead metropolitan area to quantify bat activity across space and time. We will select sites to represent major land-use and habitat settings and will recruit resident hosts to expand coverage while maintaining standardized placement rules. Field teams will deploy AudioMoth recorders on a rotating schedule, document site metadata, and perform routine maintenance and quality checks. Recordings will be retrieved and processed through an established workflow that identifies bat-active segments and generates quality-controlled activity metrics; subsets of data will be reviewed to verify classification performance and to refine procedures if needed. Outputs from this activity will include a georeferenced dataset of nightly activity indices, seasonal summaries by site class, and mapped products that highlight hotspots and temporal patterns. These outputs will support resource management discussions by providing an evidence base for where and when bats are active within the city landscape. Activity outcomes will be evaluated by monitoring deployment completeness, data yield per site, classification accuracy on reviewed subsets, and the timely production of mapped and tabular deliverables.

Activity Milestones:

Description	Approximate Completion Date
Purchase of AudioMoth devices and ancillary equipment	July 31, 2027
Full scale network testing	September 30, 2027
Citizen Scientist recruitment and training	December 31, 2027
Full season deployment	March 31, 2028
Complete season report	December 31, 2028
Adjustments and second season deployment	February 28, 2029
Finalize publicly available database	June 30, 2030

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 disseminate results to entities that can use them for conservation and management by providing interim and final summaries to Minnesota DNR staff and by offering briefings to local partners such as city parks, planning, and environmental advisory groups. We will share products with ecologists and biologists by releasing a curated data package, metadata, and technical report, and by presenting results at appropriate Minnesota meetings and seminars. To make outcomes accessible to Minnesotans, we will maintain a public project webpage with interactive maps, plain-language summaries, and selected audio examples, including frequency-shifted listening files that allow residents to hear bats recorded near their homes. We will conduct on-campus workshops for residents and educators that demonstrate data exploration and support classroom use, including collaboration with Moorhead-area teachers. We will collaborate with Moorhead Public Works Director, Paul Fiechtner (see attached letter) on efforts to raise community awareness of in-town bats. All communications will acknowledge ENRTF support using the trust fund logo or required attribution language, and project products will be archived to ensure long-term availability.

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 be implemented through delivery of data and recommendations to the City of Moorhead including Parks and Public Works, for use in bat conservation planning and urban habitat discussions. The curated dataset, maps, and protocol will be archived on the Concordia Bat Project website and repository so researchers and educators can freely use them. After ENRTF support ends, Concordia will sustain core outreach and data access through existing student research pathways and course-based projects, while additional monitoring expansions would be pursued through partnerships, local support, and future grants. The project will serve as a model for other communities.

Project Manager and Organization Qualifications

Project Manager Name: Darin Ulness

Job Title: Professor of Chemistry

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

Darin J. Ulness is Professor of Chemistry at Concordia College in Moorhead, Minnesota, where he has served on the faculty since 1998. He is currently the Dr. Nere Sundet Endowed Chair of Chemistry and Chair of the Concordia College AI Council. Professor Ulness has experience designing and managing projects that combine instrumentation, data analysis, and student research. Over more than two decades at Concordia, he has led numerous undergraduate research projects and has experience managing externally funded research, including a National Science Foundation CAREER award and other competitive grants. His work has resulted in over 65 peer-reviewed publications spanning spectroscopy, physical chemistry, and interdisciplinary applications of mathematics and physics. Many of these works are with undergraduate students.

At Concordia, Professor Ulness has held several leadership roles, including Chair of the Division of Natural Science and Mathematics and Chair of the Promotion, Tenure, and Evaluation Committee, which required planning, budgeting, and coordination across departments. These roles have provided experience managing multi-year initiatives, supervising personnel, and working with institutional and community partners.

Through this combination of research experience, project management, student mentoring, and community engagement, Professor Ulness is well prepared to manage the proposed project, coordinate field and data activities, and ensure that project outcomes are delivered on schedule and shared effectively with partners and the public.

Organization: Concordia College

Organization Description:

Concordia College is a private liberal arts college located in Moorhead, Minnesota, founded in 1891. The college enrolls approximately 1,800 undergraduate students and is recognized for its strong programs in the sciences, environmental studies, and community engagement. Concordia's mission is to prepare students to influence the affairs of the world through thoughtful inquiry, ethical leadership, and responsible participation in society.

The college maintains modern laboratory and research facilities and supports faculty-student collaborative research across disciplines. Faculty regularly mentor undergraduate researchers in projects that integrate fieldwork, data analysis, and community partnerships. Concordia has an established record of managing external grants and supporting projects that involve environmental monitoring, scientific instrumentation, and public outreach.

Through its emphasis on experiential learning and community partnership, Concordia is well positioned to lead projects that combine scientific research, student training, and citizen engagement. The institution provides administrative, financial, and compliance support for externally funded initiatives and has the infrastructure necessary to ensure responsible stewardship of public funds and timely completion of project deliverables.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
Personnel								
Darin J. Ulness		Project Co-leader			7.65%	0.24		\$19,377
Joe Whittaker		Project Co-leader			8%	0.24		\$19,377
Summer Faculty Research Team Leaders (10 over 3 years)		Leads a team of student for their summer research experience			8%	2.49		\$53,825
Undergraduate Students (20 over 3 years)		Summer student researcher			8%	9.99		\$103,344
Moorhead High School Science Teacher		Development of learning plan to incorporate information from this project			0%	0.48		\$4,800
							Sub Total	\$200,723
Contracts and Services								
							Sub Total	-
Equipment, Tools, and Supplies								
	Equipment	AudioMoth, case, adaptor, and data cards (140 units)	These devices record the bat calls					\$24,840
	Equipment	4 bay NAS and 4Tb harddrives	Data storage					\$1,662
	Tools and Supplies	Electronics and hardware supplies	Electronic sensors and microcontrollers to supplement AudioMoth data. This will allow for the collection of atmospheric conditions at the time of the recordings.					\$8,000
	Tools and Supplies	Signage	Signs for the city of Moorhead to hang near the AudioMoths that are on city property. This is for both educational purpose and to alert the public of a recording device					\$1,000

	Tools and Supplies	Rechargeable batteries (600)	The AudioMoths require 3 AA batteries to run.					\$625
	Tools and Supplies	Battery charger (5)	To recharge the rechargeable batteries					\$150
							Sub Total	\$36,277
Capital Equipment								
							Sub Total	-
Acquisitions and Stewardship								
							Sub Total	-
Travel In Minnesota								
	Miles/ Meals/ Lodging	In-town travel to service AudioMoths. Short (approximately 10 - 12 miles) daily trips to various sectors around Moorhead March - October. Concordia vehicles will be used, 2-3 students per vehicle	The AudioMoths need to be serviced roughly weekly. They will be divided into five sectors. Research students will service 1 sector per day.					\$9,000
	Conference Registration Miles/ Meals/ Lodging	1 or 2 in-state trips per year. 400 miles, \$0.50/mile, 2-3 people.	For dissemination of results, meeting with state scientists, etc.					\$4,500
							Sub Total	\$13,500
Travel Outside Minnesota								
							Sub Total	-
Printing and Publication								
	Publication	Publication costs (3 years)	To cover the cost dissemination of results. This could include journal publications costs, poster printing, etc.					\$3,000
							Sub Total	\$3,000
Other Expenses								

		Community engagement events (approximately 5 events)	Covers costs of hosting community events such as educational nights for Moorhead residents, partner events with the Moorhead Public Works department, etc					\$1,500
							Sub Total	\$1,500
							Grand Total	\$255,000

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
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Non ENRTF Funds

Category	Specific Source	Use	Status	Amount
State				
			State Sub Total	-
Non-State				
In-Kind	1/18 FTE for Darin J. Ulness	Development of preliminary experiements and data analysis	Secured	\$4,400
In-Kind	1/24 FTE for Joe Whittaker	Preliminary experimental setup and data collection	Secured	\$3,350
Cash	Concordia Biology Department	3 AudioMoth Devices	Secured	\$450
Cash	Concordia Neuroscience Program	2 AudioMoth Devices	Secured	\$300
Cash	Sigma Zeta Research Award (National Organization)	3 AudioMoths and miscellaneous equipment	Secured	\$500
			Non State Sub Total	\$9,000
			Funds Total	\$9,000

Total Project Cost: \$264,000

This amount accurately reflects total project cost?

Yes

Attachments

Required Attachments

Visual Component

File: [cfe3bfa1-52b.pdf](#)

Alternate Text for Visual Component

Map of Moorhead, MN with a gridline overlay (black lines). AudioMoth recording devices will be placed in residential and city property location evenly distributed across the network....

Financial Capacity

Title	File
Letter From Concordia College President	9477fd4e-89b.pdf
Most recent Public Disclosure form	1bdffe4c-1d9.pdf
Secretary of State Good Standing Document	a17e76b2-f0f.pdf
Concordia College 2025 Financial Statements	4e075fcf-b6f.pdf

Supplemental Attachments

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

Title	File
Support Letter from Moorhead Mayor and Public Works Director	e3d57c3b-6e8.pdf

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?

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 proposal:

Nathalie Renehardt, Jillain Veil-Ehnert, Joe Whittacker, Mike Bush, Concordia College, Moorhead, MN. Paul Fiechtner Public Works Department, City of Moorhead.

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