



Environment and Natural Resources Trust Fund

2027 Request for Proposal

General Information

Proposal ID: 2027-425

Proposal Title: Bugs Below Zero: Engaging Communities with Winter Science

Project Manager Information

Name: Rebecca Swenson

Organization: U of MN - College of Food, Agricultural and Natural Resource Sciences

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Project Basic Information

Project Summary: Bugs Below Zero connects classrooms and communities to winter science, builds understanding of stream food webs through hands-on experiences, and fosters future scientific researchers and environmental stewards statewide.

ENRTF Funds Requested: \$432,000

Proposed Project Completion: June 30, 2030

LCCMR Funding Category: Education and Outdoor Recreation (C)

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

Narrative

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

Insects are abundant during Minnesota summers, but their winter ecology remains largely unknown to the public. How do some insects stay active in freezing conditions, and why are they essential to stream food webs? Despite Minnesota's long winters, there is limited awareness of cold-adapted insects and their importance to groundwater-fed streams. At the same time, educators and communities are seeking high-quality outdoor learning experiences that connect youth with local ecosystems, especially during winter. To address this need, we are expanding the Bugs Below Zero program, led by science communication, education, entomology, and fisheries experts. The program engages participants in observing, documenting, and learning about insects that emerge on winter snow. By incorporating STEAM (Science, Technology, Engineering, Art, and Mathematics) principles, Bugs Below Zero blends scientific investigation with creative expression. The proposed activities strengthen outreach, classroom engagement, community participation, and data sharing across Minnesota. The Bugs Below Zero program creates educator resources, community events, state-standard-aligned classroom activities, and winter field-based learning opportunities at a time when outdoor education is often limited. Increasing understanding of winter insects and their role in maintaining resilient streams and fish populations will broaden environmental literacy and encourage stewardship of Minnesota's natural resources in all seasons.

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 will expand access to environmental education resources focused on winter-active aquatic insects and create interactive events that inspire families, outdoor enthusiasts, educators, and classrooms to explore winter stream ecology. By connecting communities with winter water science, new audiences will learn to identify aquatic insects and understand the critical role of cold-adapted species in Minnesota streams. We will also strengthen pathways for hands-on research participation, encouraging deeper connections with Minnesota's natural resources.

We are seeking funding to:

- Create a series of public events where students, families, outdoor recreationists, and community members encounter Minnesota's winter aquatic insects and learn about their ecological role in cold-season stream food webs. Events will feature live insect demonstrations and highlight how weather, groundwater, stream health, insects, and fish are interconnected.
- Develop new, immersive classroom activities and offer educator professional development. We will create state standards-aligned classroom activities, digital tools, and hands-on STEAM materials. Additionally, we will host workshops to equip teachers to use these resources effectively and facilitate direct collaboration with Bugs Below Zero scientists.
- Strengthen community engagement and participatory science. We will enhance data-sharing systems, communication tools, and outreach to expand participation in our winter insect monitoring program.

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?

Minnesota's long winters provide a unique opportunity to understand how weather, groundwater, and aquatic food webs interact under freezing conditions. The outcomes of this project include: (1) Increasing public awareness of winter stream ecology, (2) Inspiring Minnesotans of all ages to explore cold-season aquatic systems, (3) Engaging additional classrooms and communities in winter data collection, observation, and science communication, and (4) Encouraging long-term environmental stewardship through increased understanding of the ecological importance of winter-adapted aquatic insects. Our partnerships with classrooms, nature centers, museums, universities, and community organizations will broaden access and reach of hands-on, immersive, winter experiences.

Activities and Milestones

Activity 1: Public engagement events that expand community awareness of winter science, strengthen access to educational resources, and inspire environmental stewardship

Activity Budget: \$147,037

Activity Description:

The Bugs Below Zero team will host a series of public outreach events, offering at least three per year for K–16 students, educators, naturalists, conservation groups, and families. Events will include interactive presentations from experts and hands-on demonstrations using live insects. These activities will deepen understanding of stream food webs and relationships among groundwater-fed streams, aquatic insects, and trout populations. To expand learning, we will integrate STEAM principles - linking ecological science with technology, data visualization/analysis, and critical thinking to build a more holistic understanding of winter ecosystems. Events will also prepare and motivate participants to join the Bugs Below Zero participatory science program. Some events will be held in partnership with nature centers, museums, and environmental learning centers—such as Eagle Bluff, River Bend Nature Center, and the Bell Museum—leveraging their strong public engagement networks. We will also participate in K–16–focused programs that engage students in winter stream ecology through live demonstrations. Additionally, we will produce supporting digital content—including videos, podcasts, recorded demonstrations, and classroom-ready modules—to extend the reach of in-person events. These events provide evidence-based, hands-on outdoor experiences that reduce participation barriers through free programming at accessible venues statewide.

Activity Milestones:

Description	Approximate Completion Date
Hold at least one outreach event at Eagle Bluff Environmental Learning Center or similar venue	June 30, 2028
Hold at least one outreach event at River Bend Nature Center or a similar venue	June 30, 2029
Hold at least one outreach event with Bell Museum programs or similar venue	June 30, 2030
Participate in at least two K-16 outreach events per year with partner organizations	June 30, 2030

Activity 2: Educator professional development that strengthens K–16 participatory science through enhanced understanding of winter ecology and environmental education

Activity Budget: \$148,070

Activity Description:

Bugs Below Zero will offer statewide professional development opportunities for K–16 teachers and youth development leaders, such as 4H. These sessions integrate the practices emphasized in the updated Minnesota science standards and incorporate STEAM-based approaches. Scientists and educators from the University of Minnesota and Southwest Minnesota State University will lead workshops featuring hands-on, inquiry-based activities with live insects. Workshops will strengthen educators’ understanding of stream food webs, the ecological importance of winter-active aquatic insects, and the role these species play in supporting healthy fish populations. Participants will receive training, classroom resources, digital tools, and lesson plans to implement the Bugs Below Zero participatory science program. Teachers completing training will be eligible for mini-grants to acquire classroom kits that support data collection and analysis activities. To reach educators across the state, workshops will be hosted in both metro and greater Minnesota locations. The professional development sessions will equip educators with tools to inspire students and build connections to Minnesota’s natural resources. This activity supports standards-aligned, inquiry-based environmental education, builds educator capacity to mentor diverse youth toward natural resources careers, and increases equitable access to high-quality outdoor learning in both metro and greater Minnesota.

Activity Milestones:

Description	Approximate Completion Date
Plan and host at least one professional development for educators in the metro area.	June 30, 2028
Plan and host at least one professional development for educators in southwestern Minnesota.	June 30, 2029
Plan and host at least one professional development for educators in central Minnesota.	June 30, 2030

Activity 3: Strengthening the Bugs Below Zero participatory science program and expanding communication resources

Activity Budget: \$136,893

Activity Description:

From 2023–2025, Bugs Below Zero launched a participatory science program in which volunteers walk winter stream corridors, identify and count winter-active insects, and record observations on insect behavior and activity. This program allows participants to gain skills in field observation, data collection, and environmental monitoring. The program has built a strong network of Master Naturalists, K–16 classrooms, and community members statewide. We aim to expand this network and strengthen the dataset, supporting research on winter insect biology, habitat use, and potential impacts of climate-related temperature change. We will continue developing online training modules and host seminars, workshops, and coaching sessions to support new and returning participants. Communication efforts will include new web content, blog posts, and social media materials that highlight research findings and engage broader audiences. We will also present at education and ecology conferences to increase program visibility, expand participation, and promote understanding of Minnesota’s winter insect ecology. Our participatory science program engages classrooms and community members in authentic, field-based monitoring that connects Minnesotans to local lands and waters, broadens inclusion through low-barrier activities, and strengthens stewardship via statewide partnerships.

Activity Milestones:

Description	Approximate Completion Date
Develop/expand participatory science training tools.	June 30, 2028
Engage educators, classrooms, and outdoor recreationalists with the Bugs Below Zero participatory science program.	June 30, 2029
Encourage use of datasets in the classroom and evaluate engagement of participants.	June 30, 2030

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Alyssa Anderson	Southwest Minnesota State University, Biology Program	Anderson is an aquatic entomologist with expertise in winter active insects. She will help plan and execute events, provide entomology and aquatic ecology expertise to event and communication materials, interact with Bugs Below Zero volunteers, act as lead for the community science activity, and review data provided by the program	Yes
Troy McKay	University of Minnesota	McKay is a digital media instructor who will help support the creation of digital educational resources (like videos, podcasts, and photo tours) that result from the events. He also works with K12 teachers and 4H Youth Development Leaders.	Yes
Kandy Noles Stevens	Southwest Minnesota State University, School of Education	Noles Stevens is a STEM teacher education specialist and veteran educator who will support teacher education to promote BBZ to K12 schools. She will lead educator professional development and the dissemination of curricular resources.	Yes
Amy Schrank	University of Minnesota Sea Grant	Schrank will help plan and execute events, provide fisheries expertise to events and materials, and help communicate event and educational materials through University of Minnesota Sea Grant channels.	Yes
Greta Tank	University of Minnesota, Agricultural Education & Communication	Tank is an Education Program Specialist who will support the instructional design of classroom resources, teacher professional development, and outreach with youth educators. She works with K12 classroom teachers and 4H Youth Development Leaders.	Yes
Bruce Vondracek	University of Minnesota	Vondracek is an emeritus professor in the Department of Fisheries, Wildlife, and Conservation Biology at the University of Minnesota. He will help plan and execute events.	No
Jennifer Stampe	Bell Museum	Stampe will be the contact person for the Bell Museum and will coordinate staff support, facilities, and communication support for Bugs Below Zero events hosted by the Bell Museum.	Yes
Colleen Foehrenbacher	Eagle Bluff Environmental Learning Center	Foehrenbacher will serve as the primary contact for Eagle Bluff Environmental Learning Center and will coordinate staff support, facilities, and communication support for Bugs Below Zero events hosted by Eagle Bluff	Yes
Brittany Smith	River Bend Nature Center	Smith will serve as the primary contact for River Bend Nature Center and will coordinate staff support, facilities, and communication support for Bugs Below Zero events hosted by River Bend.	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 data collected from our participatory science program will be shared on Anecdota, a free online, open platform for sharing citizen science data. This will allow us to both gather and share data observations with any researcher or organization.

In addition, we have a robust communication and outreach plan for sharing insights and information. Besides our large-scale public events, we will also disseminate our information using our partner websites, their networks, newsletters, email lists, and social media channels (Bell Museum, Riverbend, and Eagle Bluff, SeaGrant, Southwest Minnesota State University, and the University of Minnesota). We will also use established email lists and events to reach Minnesota educators and their classrooms.

To ensure longevity and access, our team will develop podcasts, videos, lesson plans, infographics, and academic materials and share information on a website and social media channels dedicated to the Bugs Below Zero project. Additional communication, outreach, and dissemination efforts are described in the main narrative. We hope that our dissemination efforts will share data, and also allow Minnesotans to deepen their understanding, awareness, and enjoyment of winter science, stream ecology, and environmental stewardship. On all communication materials and at events, the Environment and Natural Resources Trust Fund will be acknowledged through use of the trust fund logo and attribution language on project print and electronic media, publications, signage, and other communications. We will follow the ENTRF Acknowledgment 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 educational resources developed through this project will remain publicly available on the Bugs Below Zero website, ensuring long-term access for teachers, students, families, and community educators. These materials—including videos, blog posts, lesson plans, and infographics—will continue to support year-round environmental learning focused on winter ecology. Findings from our participatory science program will be shared through academic publications, conference presentations, and partnerships with environmental and outdoor education organizations to extend their impact. After project completion, the Bugs Below Zero team will incorporate ongoing resource updates, training opportunities, and data collection efforts into existing University-supported outreach programs.

Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
Bugs Below Zero: Engaging Citizens in Winter Research	M.L. 2022, , Chp. 94, Art. , Sec. 2, Subd. 05e	\$198,000

Project Manager and Organization Qualifications

Project Manager Name: Rebecca Swenson

Job Title: Professor

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

Dr. Rebecca Swenson will serve as the project manager. She will plan and execute events, develop an outreach plan, draft communication content, manage student workers, engage with Bugs Below Zero volunteers, and support the creation and development of all educational materials and partnerships. Dr. Swenson has been teaching courses related to agricultural and environmental science communication in the College of Food, Agricultural and Natural Resource Sciences (CFANS) at the University of Minnesota since 2012. She collaborated with a team of University of Minnesota students and faculty experts in communication, entomology, and fisheries, wildlife, and conservation biology to develop the initial Bugs Below Zero pilot materials and program. Her research focuses on science communication and engagement, particularly in agricultural and environmental storytelling, science communication training, community-building, and public engagement with science. Prior to her current role, Dr. Swenson worked in marketing communications. She holds a Bachelor’s degree in journalism from the University of Wisconsin-Madison and a Master's degree and PhD in Mass Communication from the University of Minnesota.

Organization: U of MN - College of Food, Agricultural and Natural Resource Sciences

Organization Description:

The Agricultural Education, Communication & Marketing (AECM) department at the University of Minnesota equips students to become successful leaders, educators, and communicators in the agricultural, food, and natural resource sectors. The department offers a comprehensive curriculum in education, communication, and marketing for both undergraduate and graduate students. Courses include writing, public speaking, podcasting, visual design, video production, and virtual or streaming field trips. The AECM department is part of the College of Food, Agricultural & Natural Resource Sciences (CFANS) at the University of Minnesota.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
Personnel								
Project Manager		Serve as project director. Manage timelines and work of the grant. Lead planning of events, outreach work, and manage communication activities. Coordinate meetings and partner relationships. Provide science communication expertise.			36.6%	0.48		\$120,578
Co-Investigator		Help plan and execute events, provide fisheries expertise to events and materials, and help communicate event and educational materials through partner communication channels. Plan and execute events, provide fisheries expertise.			36.6%	0.15		\$25,416
Collaborator		Help support the instructional design of classroom resources, teacher professional development, and outreach with youth educators.			36.6%	0.15		\$15,557
Collaborator		Help support the creation of digital educational resources (like videos, podcasts, and photo tours).			36.6%	0.12		\$22,699
Director of Public Engagement and Science Learning		Assist with events at the Bell Museum. Provide oversight for content development, program planning, and activity delivery at the Bell.			36.6%	0.01		\$740
Exhibits & Gallery Programs Manager		Assist with events at the Bell Museum. Provide activity development support at the Bell. Coordinate staff support, facilities, and communication support for events hosted at the Bell.			36.6%	0.01		\$554
Gallery Programs Coordinator		Assist with events at the Bell Museum. Help plan public outreach events that include hands-on demonstrations of aquatic insects and environmental materials for K12 students, educators, naturalists, and families. Coordinate staff support, facilities, and communication support for events hosted at the Bell.			36.6%	0.01		\$1,106
Public Programs Assistant		Assist with events at the Bell Museum. Help plan public outreach events that include hands-on demonstrations of aquatic insects and			36.6%	0.01		\$850

		environmental materials for K12 students, educators, naturalists, and families. Coordinate staff support, facilities, and communication support for events hosted at the Bell.						
Undergraduate student workers		Assist with drafting science communication content, running video equipment, supporting video editing, editing the Bugs Below Zero website, supporting event planning and execution, and interacting with researchers from communication, entomology, and fisheries, in order to help understand the research and translate insights for public audiences.			0%	1.5		\$44,509
							Sub Total	\$232,009
Contracts and Services								
Southwest Minnesota State University (SMSU)	Subaward	Activities include participation in public engagement and outreach events, development of educational resources, leading educator professional development, expanding the participatory science program and contributing to professional presentations. Personnel: \$142,608, Printing: \$3,000, Supplies: \$14,000, Travel: \$9,000				0.9		\$168,609
Riverbend	Subaward	River Bend will help plan public outreach events that include hands-on demonstrations of aquatic insects and environmental materials for K12 students, educators, naturalists, and families. River Bend will coordinate staff support, facilities, and communication support and host events. Personnel: \$1250, Facilities costs for events: \$1500, Printing: \$250				0.01		\$3,000
Eagle Bluff	Subaward	Eagle Bluff will help plan public outreach events that include hands-on demonstrations of aquatic insects and environmental materials for K12 students, educators, naturalists, and families. Eagle Bluff will coordinate staff support, facilities, and communication support and host events. Personnel: \$1250, Facilities costs for events: \$1500, Printing: \$250				0.01		\$3,000

Bug Expert (Wet Bugs)	Service Contract	Funds are requested for contractual services to a bug expert like Wet Bugs, LLC. (Wet Bugs is a private business that specializes in providing live insects for interactive, educational workshops.) These funds will allow us to include live insects at our events. (1500/year for 3 years)				0.03		\$4,500
							Sub Total	\$179,109
Equipment, Tools, and Supplies								
	Tools and Supplies	Digital publishing tools like website hosting, renewal, tools, software, and online storage	To support the hosting and sharing of digital communications and websites					\$1,682
	Tools and Supplies	Event supplies, insect guides for educators	These are supplies needed for hands-on activities at events and materials for educator professional development sessions					\$2,400
							Sub Total	\$4,082
Capital Equipment								
							Sub Total	-
Acquisitions and Stewardship								
							Sub Total	-
Travel In Minnesota								
	Miles/ Meals/ Lodging	Year 1 travel (approx 5 people; \$720 per person)	Travel for events, trainings, and to capture digital footage					\$3,600
	Miles/ Meals/ Lodging	Year 2 travel (approx 5 people; \$720 per person)	Travel for events, trainings, and to capture digital footage					\$3,600
	Miles/ Meals/ Lodging	Year 3 travel (approx 5 people; \$720 per person)	Travel for events, trainings, and to capture digital footage					\$3,600
							Sub Total	\$10,800
Travel Outside Minnesota								
							Sub Total	-

Printing and Publication								
	Printing	Communication material development - Year 1	Communication material development, printing and mailing costs					\$2,000
	Printing	Communication material development - Year 2	Communication material development, printing and mailing costs					\$2,000
	Printing	Communication material development - Year 3	Communication material development, printing and mailing costs					\$2,000
							Sub Total	\$6,000
Other Expenses								
							Sub Total	-
							Grand Total	\$432,000

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				
			Non State Sub Total	-
			Funds Total	-

Total Project Cost: \$432,000

This amount accurately reflects total project cost?

Yes

Attachments

Required Attachments

Visual Component

File: [8f2bbb12-7b7.pdf](#)

Alternate Text for Visual Component

This is a postcard that gives an overview of some Bugs Below Zero program components....

Supplemental Attachments

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

Title	File
Screenshot of bugsbelowzero.com	d8a3f4e2-2e0.png
SPA letter UMN	72791d4a-917.pdf
Letter of Support - Riverbend	703cc594-f37.pdf
Letter of Support - Eagle Bluff	eca97c54-cda.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 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 proposal:

Melissa Sullivan, University of Minnesota

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