Environment and Natural Resources Trust Fund

2024 Request for Proposal

General Information

Proposal ID: 2024-027

Proposal Title: Phenology Investigations in Minnesota Schools

Project Manager Information

Name: Robert Blair

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

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Project Basic Information

Project Summary: Provide professional development workshops at three Greater Minnesota locations for 60 teachers to use phenology education curriculum and community science resources, reaching >7,000 students in the first three years.

Funds Requested: $392,000

Proposed Project Completion: June 30, 2027

LCCMR Funding Category: Environmental Education (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.

Ask science students in Minnesota what climate is about and they might respond, "It's complicated." It's true. Climate is the result of a series of scientifically complex interconnected systems. This complexity has generated confusion around what climate is and how it impacts natural and human communities. What if climate science could be simply explained as paying attention to when the ice goes out on a lake, when a flower blooms, or when a butterfly first appears to pollinate that flower? What if students learn how to track climate change in their own Minnesota schoolyards? What if these simple observations could lead to deeper understandings around climate change and how it impacts our state?

Phenology is the study of the timing of biological events such as animal breeding, plant flowering, and bird migration. Seasonal change in climate is a major driver of phenological timing. Thus, phenology is a great way to learn about the environment and to teach about climate change. When the climate changes, so can the timing of these life cycle events. In fact, phenology has provided the best evidence that plants and animals are sensing and responding to climate change. Phenological changes can be a problem for Minnesota.

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.

The established University of Minnesota Driven to Discover: Phenology and Nature's Notebook curriculum will be utilized in this project partners with USA-NPN and features Nature's Notebook as a community science program. The accompanying University of Minnesota Season Watch: Tracking nature's cycle in Minnesota website provides many resources specifically focused on Minnesota phenology. Additional training from phenology experts will empowers teachers to use the curriculum to create a deeper understanding of phenology and climate change in Minnesota students. Trained, experienced lead teachers will aid in program implementation in the classroom. The proposed phenology workshops are modeled after the University's successful Driven to Discover workshops.

Phenology Investigations in Minnesota Schools workshops will bring in phenology experts and trained lead teachers to provide detailed background information to enable adaptation of the Phenology and Nature's Notebook curriculum and Season Watch resources to specific classroom needs, emphasizing not only awareness of phenology and climate change but also the importance of building a valuable database of information about phenology and climate change and its impact on important Minnesota species. By offering workshops in Greater Minnesota environmental learning centers, a broad sector of students will investigate phenological changes and examine the relationship between phenology and 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?

When the climate changes, so can the timing of biological life cycle events - phenology has provided the best evidence that plants and animals are sensing and responding to climate change. This program shares expert-guided information from the University's established phenology curriculum and LCCMR-funded Season Watch website with teachers who will in turn reach thousands of Minnesota students and their families. Monitoring phenological changes with the community science project Nature's Notebook allows students to engage with nature in an experiential way, contribute to scientific phenological data analysis, and understand the implications of climate change on Minnesota's plants and animals.

Activities and Milestones

Activity 1: Recruit middle- and high-school science and agriculture teachers to participate in phenology workshops at Greater Minnesota environmental learning centers.

Activity Budget: $15,105

Activity Description:
We will use our well-developed network of over 1500 teachers state-wide who have participated in previous Driven to Discover Citizen programs or other recent LCCMR-funded UMN teacher professional development programs (Outdoor Investigations in the STEM Classroom, Pollinators in the Science Classroom) as well as our connections with science directors from dozens of districts throughout the state and educator associations to recruit teachers for Phenology Investigations in Minnesota Schools. Our recruitment emphasis will be on Greater Minnesota school districts. Twenty grade 6-12 teachers will be recruited each year for three cohort years, totaling 60 teachers. Four 2-day workshops will be held at a Greater Minnesota location each of the three cohort years, with a workshop taking place in each of the four seasons, to study the phenology of Minnesota. Each cohort year will meet in a different geographic area of Greater Minnesota. Workshop locations will be at economical environmental learning centers or similar camp-like centers (e.g. Osprey Wilds Environmental Learning Center in Sandstone (northeast MN/Northwoods), Eagle Bluff Environmental Learning Center in Lanesboro (southern MN/Big Woods) and will include lodging and meals at the center so that teachers are fully immersed in nature for the duration of each weekend.

Activity Milestones:

Description	Approximate Completion Date
Recruit 20 teachers to participate in Greater Minnesota phenology workshops during school year 2024-2025.	June 30, 2025
Recruit 20 teachers to participate in Greater Minnesota phenology workshops during school year 2025-2026.	June 30, 2026
Recruit 20 teachers to participate in Greater Minnesota phenology workshops during school year 2026-2027.	June 30, 2027

Activity 2: Train teachers in four two-day phenology workshops (summer, fall, winter, spring) using existing curriculum and online materials developed for phenology.

Activity Budget: $346,686

Activity Description:
Four 2-day workshops will be held at a Greater Minnesota location each of the three cohort years to study the phenology of Minnesota. The purpose of spreading the workshops throughout the year is for teachers to experience phenology during each season (summer, fall, winter, and spring). The NSF-funded curriculum Driven to Discover: Phenology and Nature's Notebook and the LCCMR/ENRTF Season Watch website will be utilized to teach about Minnesota phenology and climate change, community science, and the scientific process. Teachers will conduct phenology investigations throughout the year. We will help teachers plan for the implementation of the curriculum materials, use of the website, and student investigations. Our team consists of three scientists - Blair, Abbie Anderson (UMN Forest Resources), and Josh Leonard (Belwin Outdoor Science and MnPN) - and two lead teachers who have previously implemented the workshop materials in their classrooms. Each workshop will include lodging and meals at the environmental learning center so that teachers are fully immersed in nature, which will allow them to engage with nature in an experiential way, contribute to scientific data analysis, and understand the implications of climate change on Minnesota's plants and animals in the same location for one full phenological

Activity Milestones:

Description	Approximate Completion Date
Train 20 teachers in phenology education materials in four two-day workshops during school year 2024-2025.	June 30, 2025
Train 20 teachers in phenology education materials in four two-day workshops during school year 2025-2026.	June 30, 2026
Train 20 teachers in phenology education materials in four two-day workshops during school year 2026-2027.	June 30, 2027

Activity 3: Assist teachers during the school year with implementation of phenology education in their classrooms and schoolyards with ongoing mentoring.

Activity Budget: $30,209

Activity Description:

In our previous professional development programs for teachers, we have found that mentoring those teachers during the school-year greatly increases their success in implementing program materials in the classroom. Consequently, we will continue our work with the cohort of teachers throughout the school year. Specifically, the program instructor of Phenology Investigations in Minnesota Schools will be a former school teacher who now specializes in teacher development. The program instructor will write a monthly newsletter for the teachers to keep them updated on the program and including valuable resources and information on relevant phenology events. The program instructor will be available to visit the teacher' classrooms upon request to assist with implementation during the school year, and be on-call to problem-solve with the teachers as issues arise. We have also found that our teachers benefit from hearing how their fellow cohort teachers are implementing the curriculum in their classroom. Consequently, we will host a teacher panel at each workshop throughout the year where the teachers will be able to discuss their implementation challenges and successes and share implementation tools that they have developed.

Activity Milestones:

Description	Approximate Completion Date
Assist 20 workshop teachers with implementation of the phenology curriculum materials during school year 2024-2025.	June 30, 2025
Assist 20 workshop teachers with implementation of the phenology curriculum materials during school year 2025-2026.	June 30, 2026
Assist 20 workshop teachers with implementation of the phenology curriculum materials during school year 2026-2027.	June 30, 2027

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Rebecca Montgomery	UMN and the Minnesota Phenology Network	Advisory	No
John Latimer	KAXE and the Minnesota Phenology Network	Advisory	No

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?

Phenology Investigations in Minnesota Schools will be effective long after the initial workshops. Teachers will be able to use the Driven to Discover: Phenology and Nature's Notebook curriculum and Season Watch website for years after the training. The curriculum materials are available to download for free from the UMN Extension website. The Nature's Notebook phenology community science tool is available as a free app through its website, allowing students to contribute phenology data season after season and year after year. Classroom community science phenology monitoring efforts will continue to be shared when impactful to phenology and climate change efforts.

Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
Minnesota Master Naturalist: Nature For New Minnesotans	M.L. 2021, First Special Session, Chp. 6, Art. 6, Sec. 2, Subd. 05d	$293,000

Project Manager and Organization Qualifications

Project Manager Name: Robert Blair

Job Title: Professor

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

Rob Blair is a professor of Fisheries, Wildlife, and Conservation Biology at the University of Minnesota. In his role as an Extension Specialist, he developed the Driven to Discover Citizen Science teacher training program, which focuses on helping teachers use citizen science in the classroom. This NSF-funded project resulted in several curricula aligned with various national citizen-science projects including Driven to Discover Curriculum Guide: Phenology and Nature's Notebook, which will be the core curriculum of this project. Blair will use both his expertise in providing professional development for in-service teachers and his knowledge of phenology in executing this project.

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

Organization Description:

University of Minnesota Extension discovers science-based solutions, delivers practical education, and engages Minnesotans to build a better future. UMN Extension Natural Resources helps Minnesotans explore, understand and conserve their environment by creating programs to engage Minnesotans in making a difference in their lives,

communities, and environments. Two of its well-known programs are Minnesota Master Naturalist and the Driven to Discover Citizen Science teacher training program.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	$ Amount
Personnel								
Program Coordinator		The Program Coordinator will coordinate recruiting and registration, organize logistical details for each workshop, order supplies and materials, and work with HR on payments and stipends.			32%	0.75		$61,507
Program Instructor		The Program Instructor will coordinate curriculum and instruction for each workshop, write a monthly newsletter, offer classroom implementation support, and mentor teachers.			32%	1.14		$58,960
Graphics/Web Support		The Graphics/Web Support will assist with program graphic work and web updates.			32%	0.09		$5,624
Staff Phenology Scientist		The Staff Phenology Scientist will provide phenology education training to teachers, present the Driven to Discover: Phenology and Nature's Notebook and detailed phenology information to participants, and will lead a group of teachers as they conduct a phenology investigation.			32%	0.6		$38,163
Principal Investigator		The PI will supervise all personnel, maintain budgets, report on grant progress, and participate in instruction at all workshops.			36.8%	0.09		$17,000
							Sub Total	**$181,254**
Contracts and Services								
Lead Teacher 1	Professional or Technical Service Contract	Lead Teacher will collaborate with the Phenology Investigations in Minnesota Schools team to provide phenology education training to teachers. Lead Teacher will assist phenology scientists in presenting the Driven to Discover: Phenology and Nature's Notebook to participants and will assist a group of teachers as they conduct a phenology investigation.				0.12		$10,500
Lead Teacher 2	Professional or Technical Service Contract	Lead Teacher will collaborate with the Phenology Investigations in Minnesota Schools team to provide phenology education training to teachers. Lead Teacher will assist phenology scientists in presenting the Driven to Discover: Phenology and				0.12		$10,500

		Nature's Notebook to participants and will assist a group of teachers as they conduct a phenology investigation.						
Lead Teacher 3	Professional or Technical Service Contract	Lead Teacher will collaborate with the Phenology Investigations in Minnesota Schools team to provide phenology education training to teachers. Lead Teacher will assist phenology scientists in presenting the Driven to Discover: Phenology and Nature's Notebook to participants and will assist a group of teachers as they conduct a phenology investigation.				0.12		$10,500
							Sub Total	**$31,500**
Equipment, Tools, and Supplies								
	Tools and Supplies	Binoculars (60 = 1 per teacher)	Basic binoculars are used for direct visual assessment of monitored species, for example trees and birds.					$3,200
	Tools and Supplies	Teacher Journals (60 = 1 per teacher)	Journals will be used for phenological observations, including illustrations and notes.					$180
	Tools and Supplies	Minnesota Phenology Calendar (60 = 1 per teacher)	The Minnesota Weatherguide Environment calendar includes information on Minnesota phenology and more.					$950
	Tools and Supplies	Watercolor Pencils (60 = 1 per teacher)	Use for wet and dry sketching techniques in nature journaling.					$700
	Tools and Supplies	Teacher Hand Lens (60 = 1 per teacher)	High-quality metal hand lens with a metal folding cover and light source. View small specimens in great detail.					$800
	Tools and Supplies	Minnesota Phenology (book) (68 = 60 teachers plus 8 staff)	Phenology is the study happenings in the natural world: when birds migrate, when flowers bloom, the weather conditions. Larry Weber makes an intimate study of the natural world from his home in Barnum, Minnesota.					$900
	Tools and Supplies	Student Hand Lens (1800 = 1 classroom set of 30 per teacher)	High-impact durable plastic with dual lens magnifiers: 5X and 15X. View small specimens in great detail.					$1,500
	Tools and Supplies	Program Supplies	General workshop supplies such as name badges, pencils, ball-point pens,					$396

			post-it notes, permanent markers, chart paper, folders, scissors, etc.					
	Tools and Supplies	Collapsible Utility Wagons (2)	As we will be traveling to Greater Minnesota for our off-site workshops as well as spending our workshop time outdoors in parks, we will be hauling all of our workshop materials outdoors.					$170
	Tools and Supplies	Aluminum Tags (500)	Tags are used to mark plants that will be observed for phenological changes throughout the year in schoolyards and parks. Debossed mark remains visible, regardless of weather, grease, pitch or dirt.					$100
	Tools and Supplies	Flagging Tape (60 = 1 per teacher)	Flagging tape will be used to mark off areas in the schoolyard for phenological observations. Neon-colored flagging can be easily seen and is made of vinyl.					$400
	Tools and Supplies	Heavy-Duty Storage Bins (6)	As we will be traveling to Greater minnesota for our off-site workshops, we will be hauling all of our workshop materials. These containers will keep them safe from outdoor elements so that they may be used from year-to-year.					$100
	Tools and Supplies	Program t-shirt (68 = 60 teachers plus 8 staff)	Program t-shirts will unify cohort teachers, remind them of the program, and help promote the program to others. T-shirts will include LCCMR acknowledgement.					$700
	Tools and Supplies	Outdoor Supplies	Because programming will be held outdoors, we will have on hand a first-aid kit, emergency rain ponchos, insect repellent, and sunscreen for participants and staff.					$400
							Sub Total	**$10,496**
Capital Expenditures								
							Sub Total	**-**

Acquisitions and Stewardship								
							Sub Total	**-**
Travel In Minnesota								
	Miles/ Meals/ Lodging	Meals & Lodging for Teachers (60 teachers (20 teachers per year for 3 years), one night lodging & 4 meals per workshop; 4 workshops per teacher)	60 teachers (20 teachers per year for 3 years) will require one night lodging and 4 meals each workshop for four workshops per year, totaling 240 nights lodging and 960 meals. Lodging & meals will be provided at economical residential environmental learning centers or similar camp-like centers. Total cost will average $155 per teacher per workshop.	X				$37,200
	Miles/ Meals/ Lodging	Mileage for Staff - 8 staff members x 750 miles per year x $.655	Staff will travel to off-site locations throughout Greater Minnesota for each workshop, totaling 750 miles per year for 3 years.					$11,790
	Miles/ Meals/ Lodging	Meals & Lodging for Staff (8 staff members, one night lodging & 4 meals per workshop; 4 workshops per staff member for each of 3 years)	8 staff members will require one night lodging and 4 meals each workshop for four workshops per year for 3 years, totaling 128 nights lodging and 384 meals. Lodging & meals will be provided at economical residential environmental learning centers or similar camp-like centers. Total cost will average $155 per staff member per workshop.					$14,880
							Sub Total	**$63,870**
Travel Outside Minnesota								
							Sub Total	**-**
Printing and Publication								
	Printing	Curriculum handouts for workshops (60 sets of handouts x 4 sets per teacher)	Print 4 sets (1 set per workshop) of phenology curriculum-related					$1,440

			handouts per teacher @ $6 per set of handouts.					
	Printing	Curriculum Guide (60 = 1 per teacher)	Print one copy of University of Minnesota's Driven to Discover: Phenology and Nature's Notebook per teacher @ $18 per book.					$1,080
	Printing	Laminated phenology cards (60 sets = 1 per teacher)	Print one set of phenology cards per teacher @ $6 per set of cards.					$360
							Sub Total	**$2,880**
Other Expenses								
		Teacher Stipend (60)	60 teachers (20 teachers per year for 3 years) will be provided with a $200 per workshop day stipend for a total of $1,800 per teacher. The stipend will be paid upon successfully fulfilling the requirements of the program, including participating in all four cohort workshops, preparing and carrying out a program implementation plan, and completing workshop reflections. Teachers receive stipends to attend professional development workshops outside of their contract year. This is often dictated by their contracts and is used to offset expenses for attending including travel expenses and child care. This is a mandatory feature of grants from the Minnesota Department of Higher Education and the National Science Foundation.					$96,000
		Processing Fee for Graduate Credit	Participants will receive one free University of Minnesota graduate credit: tuition will be waived, and the $100 administration fee per registrant (and applicable student fees) will be covered by this grant.					$6,000
							Sub Total	**$102,000**
							Grand Total	**$392,000**

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
Travel In Minnesota	Miles/Meals/Lodging	Meals & Lodging for Teachers (60 teachers (20 teachers per year for 3 years), one night lodging & 4 meals per workshop; 4 workshops per teacher)	Justification: The Phenology Investigations in Minnesota Schools workshops will be residential so that teachers may be fully immersed in nature for the weekend phenology workshops. Because the workshops are being held in Greater Minnesota, teachers may have to travel extensively - having teachers housed for the night between the two workshop days ensures they will be present both days and allows for extended experiential time with scientists and instructors.

Non ENRTF Funds

Category	Specific Source	Use	Status	Amount
State				
			State Sub Total	**-**
Non-State				
			Non State Sub Total	**-**
			Funds Total	**-**

Attachments

Required Attachments

Visual Component

File: 84a43161-b6d.pdf

Alternate Text for Visual Component

Phenology Investigations in Minnesota Schools provides professional development workshops at three Greater Minnesota locations for 60 teachers to use phenology education curriculum and community science resources, reaching >7,000 students in the first three years. Recruit/train teachers in four two-day workshops using existing curriculum and assist teachers with implementation....

Optional Attachments

Support Letter, Photos, Media, Other

Title	File
SPA Approval for Blair	28722c16-613.pdf

Administrative Use

Does your project include restoration or acquisition of land rights?

No

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?

Yes, Sponsored Projects Administration

Does your project include the design, construction, or renovation of a building, trail, campground, or other capital asset costing $10,000 or more?

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?

No