

**Environment and Natural Resources Trust Fund  
2019 Request for Proposals (RFP)**

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**Project Title:**

**ENRTF ID: 129-C**

Incubating Citizen Science at the University of Minnesota

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**Category:** C. Environmental Education

**Sub-Category:**

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**Total Project Budget: \$** 1706203

**Proposed Project Time Period for the Funding Requested:** June 30, 2023 (4 yrs)

**Summary:**

Incubating Citizen Science will develop Best Practices that enable expansion of citizen science capacity in Minnesota by launching three natural-resource demonstration projects related to monitoring mammals, phenology, and invasive species.

**Name:** Robert Blair

**Sponsoring Organization:** U of MN

**Title:** Professor

**Department:** Fisheries, Wildlife, and Conservation Biology

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St. Paul MN 55108

**Telephone Number:** (651) 644-1591

**Email** blairrb@umn.edu

**Web Address**

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**Location**

**Region:** Statewide

**County Name:** Statewide

**City / Township:**

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**Alternate Text for Visual:**

UMN Extension and Zooniverse, together, will develop Best Practices for Citizen Science and launch three new citizen science projects -- Monitoring Minnesota's Mammals, Mapping Change II, and Harmful Algal Blooms.

<input type="checkbox"/>	Funding Priorities	<input type="checkbox"/>	Multiple Benefits	<input type="checkbox"/>	Outcomes	<input type="checkbox"/>	Knowledge Base
<input type="checkbox"/>	Extent of Impact	<input type="checkbox"/>	Innovation	<input type="checkbox"/>	Scientific/Tech Basis	<input type="checkbox"/>	Urgency
<input type="checkbox"/>	Capacity Readiness	<input type="checkbox"/>	Leverage	<input type="checkbox"/>		TOTAL	<input type="checkbox"/> %
<input type="checkbox"/> If under \$200,000, waive presentation?							



**PROJECT TITLE: Incubating Citizen Science at the University of Minnesota**

**I. PROJECT STATEMENT**

**This project will develop Best Practices that enable the expansion of citizen science capacity in Minnesota by launching three natural-resource citizen-science demonstration projects related to monitoring mammals, phenology, and invasive species. Citizen Science is science that involves regular citizens in the generation or analysis of data about their world.**

**Need:** Citizen science in Minnesota is experiencing explosive growth that has led to myriad independent projects with varying levels of success. In Fall 2016, we conducted a focus-group based needs assessment with 52 individuals involved in natural-resource based citizen science in the state to identify what would be useful in supporting them in their work in citizen science. We learned that projects need guidelines for best practices in project creation and management as well as assistance in executing all phases of a project's cycle. In December 2017, we did a follow up on this assessment by convening a symposium on citizen science that brought together the leaders of citizen science projects in Minnesota. The meeting was successful, with 109 attendees from across the state representing 44 organizations including universities, state agencies, county governments, and city governments. At this meeting, a theme similar to that of the needs assessment emerged. Many researchers and organizations were interested in using citizen science to address questions about Minnesota's natural features but did not know how to properly initiate and execute projects. The objective of this proposal is to address both of these needs and audiences – those of existing projects and new projects – by developing infrastructure for the creation and support of citizen science in Minnesota.

**Goals and Outcomes:** The goal of *Incubating Citizen Science* is to build the capacity for citizen science projects in Minnesota to successfully answer questions about our state's resources. The project will develop a series of practical guides serving as Best Practices (BPs) for citizen-science projects based on extensive experience by the proposing team. These BPs will be developed, tested and refined through implementation of three new natural-resource based citizen science projects. The direct outcomes of the project are:

- 1) Guidelines for Best Practices for all phases of the development of a natural-resource based citizen science project including: Project Initiation, Project Design, Volunteer Engagement, Data Management, and Results Dissemination;
- 2) The establishment of three citizen science projects spanning a range of methodologies and focal topics including the Minnesota Mammal Monitoring, Mapping Change II, and the Harmful Algal Blooms Projects;
- 3) An evaluation of the implementation of the three citizen-science projects and a revision of the Guidelines for Best Practices based on this evaluation.

**Process:** The project will occur in three steps:

- 1) Develop Best Practices for Project Initiation and Design, Volunteer Engagement, Data Management, and Dissemination.
- 2) Pilot these practices with researchers, coordinators, and volunteers by implementing the three focal projects.
- 3) Revise the Best Practices based on lessons learned from the implementation of the three projects.

**II. PROJECT ACTIVITIES AND OUTCOMES**

**Activity 1: Develop and revise Best Practices for Citizen Science.** Development of the guidelines for Best Practices for Citizen Science will be based on the five major phases for citizen science projects: Project Initiation, Project Design, Volunteer Engagement, Data Management, and Results Dissemination. The guidelines for each phase will be based on literature review, expert opinion, and surveys of experts in the field based on the Delphi Technique. Revision of the BP guidelines will be based on experience from implementing the three pilot projects (See Activity 2 below).



**Environment and Natural Resources Trust Fund (ENRTF)  
2019 Main Proposal**

**ENRTF BUDGET: \$350,848**

<b>Outcome</b>	<b>Completion Date</b>
1. Draft versions of Best Practices for Project Initiation, Project Design, Volunteer Engagement, Data Management, and Results Dissemination; development of website	6-1-20
2. Revise final guides to Best Practices and publish on dedicated website	6-1-23

**Activity 2: Pilot these best practices with researchers, coordinators, and volunteers on the Minnesota Mammal Monitoring Project, Mapping Change II, and the Harmful Algal Blooms Project.** We will incubate three new citizen science projects that span the range of citizen science project design as well as environments. The Minnesota Mammal Monitoring Project will pilot using camera traps to detect the presence of large mammals in northeastern Minnesota with the expected expansion of the project throughout Minnesota. Citizen scientists will be involved in both the deployment of the camera traps as well as in visually processing the hundreds of thousands of images that they will generate. Mapping Change Stage II will build on a currently successful project to transcribe museum specimen labels opening the project to multiple collections, which will enable the creation of phenological baselines of additional species across Minnesota. Harmful Algal Blooms will use citizen scientists to detect and monitor blue-green algae blooms on 6 test lakes in southern Minnesota based on protocols developed by an interagency team of researchers.

**ENRTF BUDGET: \$1,355,356**

<b>Outcome</b>	<b>Completion Date</b>
Develop and launch Minnesota Mammal Monitoring Project (MMMP)	6-1-21
Develop and launch Mapping Change (MC) II; BP informed augmentation of MMMP	6-1-22
Develop and launch Harmful Algal Bloom Project; BP informed augmentation of MMMP/MC	6-1-23

**III. PROJECT PARTNERS:**

**A. Partners receiving ENRTF funding**

Lucy Fortson; Professor; School of Physics & Astronomy; University of Minnesota; Project Co-Manager  
 Rob Blair, Professor, Fisheries, Wildlife and Conservation Biology, University of Minnesota Project Co-Manager  
 Andrea Lorek Strauss Extension Educator Extension, University of Minnesota, Senior Personnel

**B. Partners NOT receiving ENRTF funding**

John Fieberg, Professor, Fisheries, Wildlife and Conservation Biology, University of Minnesota  
 George Wieblen, Professor, Plant and Microbial Biology, University of Minnesota  
 Shahram Missaghi, Extension Educator, University of Minnesota

**IV. LONG-TERM- IMPLEMENTATION AND FUNDING:**

*Incubating Citizen Science* will be a four-year-long project to establish best management practices and infrastructure for starting and supporting new citizen science projects in Minnesota. Over this period, Project Co-Managers Fortson and Blair will seek long-term funding to establish a Center for Citizen Science at the University of Minnesota with the citizen science incubator at its core.

**V. TIME LINE REQUIREMENTS:**

*Incubating Citizen Science* will require four years to fully develop the best management practices for starting and running citizen science projects and to implement these practices with the three new citizen science projects. The projects can be built and deployed adding one project each in years 1-3 as the BP activities are developed and refined by input from the ongoing projects. Final publication of BPs and Project Outcomes occur in Year 4.

## 2019 Proposal Budget Spreadsheet

**Project Title: Incubating Citizen Science at the University of Minnesota**

### IV. TOTAL ENRTF REQUEST BUDGET 4 years

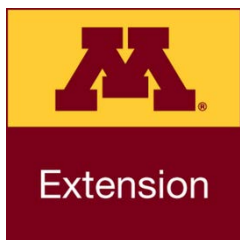
BUDGET ITEM (See "Guidance on Allowable Expenses")	AMOUNT
<b>Personnel:</b> Robert Blair, Project Co-Director (75% salary, 25% benefits); 8.3% FTE for 4 years, \$60,822 Lucy Fortson, Project Co-Director (75% salary, 25% benefits); 8.3% FTE for 4 years, \$78,427 Andrea Strauss, Senior Personnel (75% salary, 25% benefits); 8.3% FTE for 4 years, \$33,209 Projects Coordinator (75% salary, 25% benefits); 100% FTE for 4 years, \$276,129 Data Scientist Coordinator (75% salary, 25% benefits); 100% FTE for 4 years, \$309,567 Program Coordinator (75% salary, 25% benefits); 100% FTE for 4 years, \$264,581 Web Developer (75% salary, 25% benefits); 100% FTE for 4 years, \$281,468	\$ 1,304,203
<b>Professional/Technical/Service Contracts:</b> Graphic Designer for manuals, \$16,000 Copy Editor, \$10,000 Web Designer, \$24,000	\$ 50,000
<b>Equipment/Tools/Supplies:</b> 1000 Camera Traps at \$300 each for camera, housing and batteries 4 Computers for Staff at \$2000 each, dedicated computers required for project	\$ 308,000
<b>Acquisition (Fee Title or Permanent Easements):</b>	\$ -
<b>Travel:</b> 3 volunteer workshops for 4 years in greater Minnesota by 3 staff -- \$20,000 In-state travel for lead personnel for collaboration -- \$24,000	\$ 44,000
<b>Additional Budget Items:</b>	\$ -
<b>TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =</b>	<b>\$ 1,706,203</b>

### V. OTHER FUNDS (This entire section must be filled out. Do not delete rows. Indicate "N/A" if row is not applicable.)

SOURCE OF FUNDS	AMOUNT	Status
<b>Other Non-State \$ To Be Applied To Project During Project Period:</b>		
<b>Other State \$ To Be Applied To Project During Project Period:</b>	\$ -	
<b>In-kind Services To Be Applied To Project During Project Period:</b> Robert Blair, Project Co-Director (75% salary, 25% benefits); 8.3% FTE for 4 years, \$60,822 Lucy Fortson, Project Co-Director (75% salary, 25% benefits); 8.3% FTE for 4 years, \$78,427 Andrea Strauss, Senior Personnel (75% salary, 25% benefits); 8.3% FTE for 4 years, \$33,209 IDC not recovered by University of Minnesota (\$921,349)	\$ 1,093,807	
<b>Past and Current ENRTF Appropriation:</b> M.L. 2011, First Special Session, Chp. 2, Art.3, Sec. 2, Subd. 08b: Minnesota Junior Master Naturalist: An After-School Program M.L. 2015, Chp. 76, Sec. 2, Subd. 03g: Minnesota Native Bee Atlas: A Citizen Science Project	\$365,000 \$790,000	<i>Complete</i> <i>In-Progress</i>
<b>Other Funding History:</b>	\$ -	

# Incubating Citizen Science at the University of Minnesota

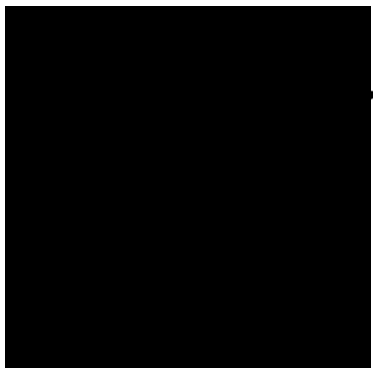
1. University of Minnesota Extension and Zooniverse combine their expertise in citizen science to develop Best Practices for Citizen Science at all stages of the process: Project Initiation & Design, Volunteer Engagement, Data Management, and Dissemination.



2. The *Incubating Citizen Science* Team assists in developing and implementing three citizen science projects that include both terrestrial and aquatic systems in Minnesota as well as a range of methodologies.



Harmful  
Algal  
Blooms



Monitoring  
Minnesota's  
Mammals



Mapping Change II

3. *Incubating Citizen Science* releases final Best Practices in Citizen Science via a dedicated website with audience-tested interfaces and clear instructions.

**Best Practices in  
Citizen Science**  
Project Initiation &  
Design

**Best Practices in  
Citizen Science**  
Volunteer  
Engagement

**Best Practices in  
Citizen Science**  
Data  
Management

**Best Practices in  
Citizen Science**  
Project  
Dissemination

**Project Manager Qualifications:**

**Dr. Rob Blair** is a Professor of Fisheries, Wildlife, and Conservation Biology in the University of Minnesota. Currently, he is the principal investigator of a National Science Foundation-funded project that is examining how citizen-science projects can be used as a springboard to authentic scientific inquiry by secondary students. In this role, Dr. Blair supervises two full-time employees and a graduate student. He also coordinates the research and work of three co-principal investigators. His role for *Incubating Citizen Science* will be similar. In conjunction with Dr. Fortson, he will hire and oversee 1) a full-time Project Coordinator who will be responsible for facilitating the process to identify best practices for citizen science, 2) a full-time Program Coordinator who will be responsible for working as a liaison between researchers and citizen science volunteers, 3) a full-time data scientist who will work with the large amounts of data generated by citizen science projects and develop best practices for data management, and 4) a full-time web developer who will be responsible for (a) developing the website and user interfaces for the Best Practices and (b) project interfaces for the 3 citizen science projects.

**Dr. Lucy Fortson** is a Professor in the School of Physics and Astronomy at the University of Minnesota. She is the co-founder of the Zooniverse online citizen science platform enabling over 1.6 million volunteers to participate in over 120 research projects from astrophysics to zoology. Dr. Fortson holds two current National Science Foundation grants for development of Zooniverse infrastructure focusing on providing data science tools for research teams to fully exploit their data classified by the volunteers. These tools include data aggregation and machine learning algorithms developed by two post-docs, two graduate students and one undergrad supervised by Fortson. Dr. Fortson collaborates nationally and internationally with leaders in citizen science and was recently instrumental in bringing the 2017 Citizen Science Association conference to Minnesota and chaired the local organizing committee.

**Andrea Lorek Strauss** is an Extension Professor at the University of Minnesota and a co-PI on the citizen science NSF administered by Blair (see above) where her role is to coordinate curriculum development and outreach. Strauss is actively involved in citizen science at the national level, serving as co-chair of the Education Working Group of the Citizen Science Association. She chaired the event CitSciMN: A Symposium for Citizen Science Practitioners in Minnesota and is the lead coordinator for the City Nature Challenge citizen science event in Minnesota.

**Organization Descriptions:**

**Monitoring Minnesota's Mammals** will train volunteers how to deploy and maintain camera traps in locations throughout the State to provide population data on Minnesota's iconic mammals including wolf, moose and bear. These data will be processed through the Zooniverse platform (similar to <https://www.zooniverse.org/projects/zooniverse/snapshot-serengeti>) where species identification, number and behavior will be tabulated by hundreds of thousands of volunteers. This project represents a hybrid approach integrating field-based and online-based citizen science which we believe will grow real capacity within Minnesota for tackling the need for mammal monitoring.

**Mapping Change II** will take advantage of new infrastructure being piloted by the Zooniverse that enables an organization to publish multiple inter-related Zooniverse projects together. This is ideal for the Bell's multiple collections that require label transcriptions allowing each collection to share online resources and providing pathways for volunteers to move easily between projects. Mounting projects in this manner will require specific BPs to be derived from single project BPs. The data registered through these label transcription projects will inform how climate change impacts the unique biomes within MN.

**The Harmful Algal Bloom Project** will engage volunteers to measure and quantify harmful algal blooms' biomass and the environmental conditions that trigger their development. These blooms pose serious environmental and human health risks due to the cyanotoxins they create. Pilot testing of lake monitoring methods is proposed under a separate ENRTF proposal. This *Incubating Citizen Science* project will mobilize volunteers to help monitor 12 lakes in southern Minnesota by applying the BPs.