

**Environment and Natural Resources Trust Fund  
2017 Request for Proposals (RFP)**

---

**Project Title:**

**ENRTF ID: 087-C**

Market Science: Connecting Minnesotans to Environmental Research

---

**Category:** C. Environmental Education

---

**Total Project Budget:** \$ 132,000

**Proposed Project Time Period for the Funding Requested:** 3 years, July 2017 - June 2020

**Summary:**

This project will support University of Minnesota researchers to bring interactive science activities to farmers markets and classrooms to promote excitement and knowledge of current environmental research.

---

**Name:** Peter Tiffin

**Sponsoring Organization:** U of MN

**Address:** 200 Oak Street SE, Ste 450  
Minneapolis MN 55455

**Telephone Number:** (612) 624-7406

**Email** ptiffin@umn.edu

**Web Address** http://cbs.umn.edu/tiffin-lab/home

---

**Location**

**Region:** Statewide

**County Name:** Statewide

**City / Township:**

---

**Alternate Text for Visual:**

A picture of visitors at a previous Market Science activity. These activities attracted more than 3,000 visitors last year. Also included are topics for future market and classroom activities.

_____ Funding Priorities	_____ Multiple Benefits	_____ Outcomes	_____ Knowledge Base
_____ Extent of Impact	_____ Innovation	_____ Scientific/Tech Basis	_____ Urgency
_____ Capacity Readiness	_____ Leverage	_____ TOTAL	_____ %



**PROJECT TITLE:** Market Science: Connecting Minnesotans to Environmental Research

## **I. PROJECT STATEMENT**

The primary goal of the proposed activity is to promote students and citizens excitement for and knowledge of current environmental research affecting Minnesota. A strong education in Science, Technology, Engineering, and Math (STEM) is of the utmost importance for preparing students for success in the economy of today and the future. Building citizens' knowledge of our state's natural resources is also important for facilitating stewardship of our air, water, and wildlife for future generations. Although many young children are enthusiastic about nature, they lack opportunities to learn about ongoing research that relates to their interests. Although adults are often knowledgeable about debates over policies in the state, they feel disconnected from current research and the scientists who conduct research. ***Our effort directly connects students and citizens to research scientists through local farmer's markets and programs in K-6 schools.***

The proposed project will connect our communities to environmental research through hands-on activities that involve direct interactions between scientists and the community. Specifically, we are proposing to expand an already successful program called "Market Science" (marketsci.org) that involves active researchers who engage the community in hands-on scientific activities at a local farmers' market (Midtown Farmers Market, Minneapolis). Market Science is a broad-based partnership currently involving a coalition of researchers from government agencies (e.g. USDA Natural Resources Conservation Service), the Minnesota Zoo, local research institutes (Stakman-Borlaug Center for Sustainable Plant Health, Bell Museum, Raptor Center, LacCore, Institute on the Environment), and research labs at local universities (U. St. Thomas, U of MN). These activities not only promote discussion between working scientists and members of the community, but also allow children (and adults) to experience science that is fun and engaging. Market Science was developed by U of MN graduate students and postdocs who were motivated by a desire to improve science education and connect citizens to societally-relevant environmental research, including work that has been funded by LCCMR.

Thus far, extensive efforts have been taken to develop engaging and relevant curricula. The success of those modules has already been evaluated, providing direction for improvement and expansion. In 2015, alone, we reached more than 3,000 members of the community through one farmers market. Importantly, this farmers market has a highly diverse constituency, including groups who are poorly represented in the sciences. Our primary mission now is to implement and expand our efforts to reach more of the community.

The proposed activities will directly serve children and adults who visit farmers' markets in the Twin Cities as well as grade-school children at elementary schools during each year of the project. The project also will support the dissemination of plans for easy-to-implement and inexpensive hands-on science activities that can be used by teachers and other groups throughout the state. Specific activities will focus on a variety of topics including bees and other pollinators, aquatic and terrestrial invasive species, wildlife conservation, and restoration of native habitats such as Minnesota prairies.

## **II. PROJECT ACTIVITIES AND OUTCOMES**

### **Activity 1: Science at the Market**

**Budget:** \$ 64,300

Local researchers from our coalition (the majority of them volunteers) will host interactive hands-on science activities at the Mpls Midtown Farmers Market (a market with high visitation by members of groups that are underrepresented in STEM) for ca. 18 weeks each market season. A selection of these activities also will be taken to at least four other farmers markets in rural or small-town MN communities each summer. The activities for each week will be centered on a specific theme and will attract different types of visitors and engage them in different ways. Some visitors will learn from attractive visual displays while others will actively participate in interactive demonstrations. For example, visitors will engage with live plants and animals, learn how to use scientific instruments, participate in interactive games, and observe experiments. This combination of approaches will excite children as well as promote discussion between adults and the host scientists. Weekly



**Environment and Natural Resources Trust Fund (ENRTF)**

**2017 Main Proposal**

**Project Title:** Market Science: Connecting Minnesotans to Environmental Research

themes and activities have been developed already including "Pollinators", "Water Quality", and "Soil Health" (see also Graphic). Our collaborators at partnering institutions will implement a host of other modules including hydrology, wildlife conservation, MN bird communities, and MN ecological history. Funding for Activity 1 will support two graduate students for each summer who will organize and implement events.

Outcome	Completion Date
1. Present Market Science activities at Minneapolis Midtown Farmers Market	June 2020
2. Present Market Science activities at farmers markets outside of the Twin Cities	June 2020

**Activity 2: Science in the Classroom**

**Budget:** \$ 67,700

During the school year, small groups of U of MN graduate students and postdocs (including individuals supported by the project and volunteers), will take a selection of activities from *Science at the Market* on the road to visit K-6 classrooms. Graduate students involved in Market Science visited Webster Elementary in Minneapolis this past fall where students participated in hands-on botany lessons. Based on this successful experience and requests from other schools, we plan to expand this program to six schools during each year of funding. We will consult with educators at each school to tailor our activities to best suit their students. We also will implement assessment tools to learn which activities are most successful from the perspective of students and teachers. These assessments will be conducted each year and used to refine our approaches and activities. We will also work with the U of MN Library's Partnership for Affordable Content program to create a free online resource where our environmental education modules are made available to teachers, other educators, and the public. Funding for Activity 2 will support one graduate student for the Fall and Spring semester each year who will organize and implement classroom visits as well as prepare education modules for dissemination.

Outcome	Completion Date
1. Lead environmental lessons in six K-6 classrooms each year of the project	May 2020
2. Disseminate environmental education modules through a free online resource	December 2019

**III. PROJECT STRATEGY**

**A. Project Team/Partners** (the Team and Partners are all affiliated with the University of Minnesota TC).

Project Team: Pls (receive funding): Peter Tiffin and David Moeller. Project Partners (no funding): Mohamed Yakub (Stakman-Borlaug Center), Ryan Briscoe Runquist, John Benning, Elizabeth Fallon. Other Contributors: A diverse group of organizations have become involved in Market Science and will be included in any given year of the project pending their availability: IonE, Minnesota Zoo, USDA NCRS, Bell Museum, Healthy Prairies, LacCore, Raptor Center, Stakman-Borlaug Center, The Bee Squad, and U. of St. Thomas Geology.

**B. Project Impact and Long-Term Strategy**

The proposed project will promote Minnesotans' science literacy, excitement for environmental research, and appreciation for the role of environmental research in protecting Minnesota's natural resources. Direct interaction between researchers and thousands of citizens and students during the project will make lasting impressions on individuals and contribute to informed communities. The project will also develop an online resource of easy-to-implement and inexpensive teaching tools freely available to educators and the public. This three-year project will set the stage for the long-term viability of Market Science as a high-impact outreach organization for Minnesotans. We believe that this expanded effort will also increase the visibility and reputation of Market Science, allowing us to pursue other sources of support including from foundations.

**C. Timeline Requirements**

We are requesting support for 36 months, from July 2017 – June 2020. This support will allow us to make 18 visits to K-6 classrooms and ca. 54 visits to regional farmers markets. Classroom visits will occur from October to May of each year while farmers' market visits will occur during the market season from May – October.

## 2017 Detailed Project Budget

**Project Title:** *Market Science: Connecting Minnesotans to Environmental Research*

### IV. TOTAL ENRTF REQUEST BUDGET 3 years

<b>BUDGET ITEM</b> (See "Guidance on Allowable Expenses", p. 13)	<b>AMOUNT</b>
<b>Personnel:</b> Each year 2 graduate students will be supported (one academic year and two during the summer). The students will plan and organize hands-on activities, will participate in all market and classroom activities, and recruit and coordinate volunteers. Students supported during the academic year will have finished their coursework and be eligible for reduced tuition. Budgeting is based on current year costs (\$9,607 stipend and \$2,834 fringe per semester. Summer: \$6100 stipend and \$1074 fringe for junior student, \$6405 stipend and 1127 fringe for senior student) and increased by 3% per year. 80% towards salary, 20% towards benefits.	\$ 123,000
<b>Professional/Technical/Service Contracts:</b>	\$ -
<b>Equipment/Tools/Supplies:</b> We are requesting \$2,066 per year to pay for development of displays and expendable items associated with hands-on-activities.	\$ 6,000
<b>Acquisition (Fee Title or Permanent Easements):</b>	\$ -
<b>Travel:</b> Mileage reimbursement (Univ. MN rate of \$ 0.54 / mile) for travel to grade schools and farmers market outside of Mpls - St. Paul, 10 trips / year average of 50 miles / trip.	\$ 1,000
<b>Additional Budget Items:</b> Space rental at farmers markets, \$500 / year.	\$ 2,000
<b>TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =</b>	<b>\$ 132,000</b>

### V. OTHER FUNDS

<b>SOURCE OF FUNDS</b>	<b>AMOUNT</b>	<b>Status</b>
<b>Other Non-State \$ To Be Applied To Project During Project Period:</b>	\$ -	N/A
<b>Other State \$ To Be Applied To Project During Project Period:</b>	\$ -	N/A
<b>In-kind Services To Be Applied To Project During Project Period:</b> Unrecovered indirect costs @ 53% of modified total direct cost base (graduate student fringe is excluded) of \$107,521	\$ 57,000	<i>Secured</i>
<b>Funding History:</b>	\$ -	N/A
<b>Remaining \$ From Current ENRTF Appropriation:</b>	\$ -	N/A



market  
science

CONNECTING MINNESOTANS TO  
ENVIRONMENTAL RESEARCH

## At the Market

**3,311** total visitors last season (May - Oct)

**174** visitors each Saturday

**50** local researchers volunteered in 2015



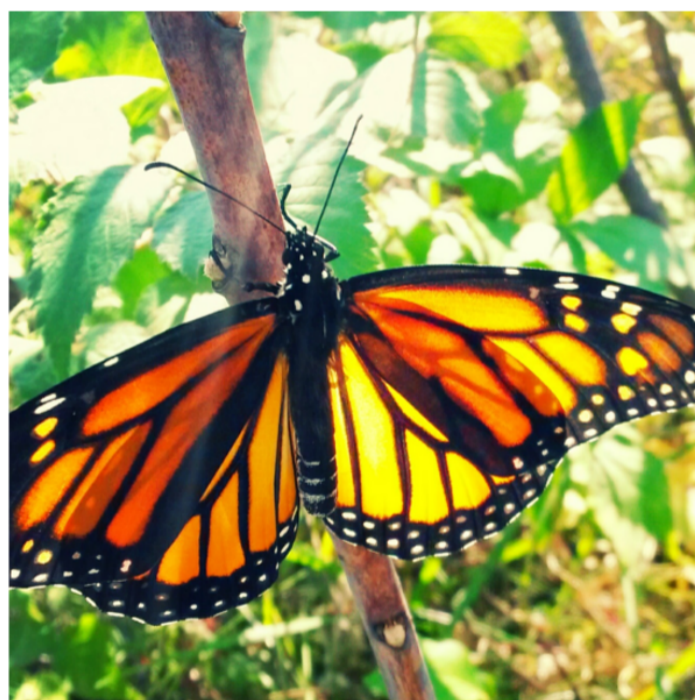
Midtown Farmers Market

TOPICS INCLUDE:

PRAIRIE CONSERVATION water quality

POLLINATORS wastewater management MN biodiversity

healthy soils lakes and hydrology INVASIVE SPECIES



## In the Classroom

Hands-on science activities promoting sustainable, informed communities



Active researchers visiting classrooms across Minnesota

**Project Manager:** Peter Tiffin

**Current Position:** Professor, Department of Plant Biology, University of Minnesota – Twin Cities

**Education:**

B.S.	1988	Botany	University of Wisconsin, Madison
M.S.	1994	Crop and Soil Science	Michigan State University
Ph.D.	1999	Zoology	Duke University

**Experience:**

As a faculty member at the University of Minnesota since 2002 I have been actively involved in science education and in research that advances our understanding of plant genetic diversity and the response of plant populations to environmental perturbations. As an educator I have taught both undergraduate and graduate courses. In these courses I have used both lecture-based delivery and more recently have started teaching in the University's Foundations of Biology course that is based on guiding undergraduate majors in Biology through active-learning activities. I have also mentored more than a dozen graduate students and post-doctoral researchers, more than half of whom have obtained University faculty positions.

As a researcher I have published seventy articles in scientific journals (<http://cbs.umn.edu/tiffin-lab/publications>) on a variety of subjects including the factors that limit species ranges, the genetics of adaptation to climate, and the response of plants to elevated concentrations of atmospheric CO<sub>2</sub>. While at the University of Minnesota I have been a principal investigator or co-principal investigator on grants from the National Science Foundation that have brought in more than \$ 2.5 million dollars to fund research in my lab.

**Organization Description**

The Department of Plant Biology and the University of Minnesota are dedicated to supporting biological research that integrates knowledge across levels of biological complexity. This includes field research, the development of collections, and the management of ecosystems. The institution is dedicated to teaching and research, especially as it pertains to biological issues that affect society.

Market Science (<http://marketsci.org/about/>) is a group of scientists from the University of Minnesota who are interested in sharing science through hands-on learning activities for kids, answering scientific questions for market goers, and facilitating dialogue between researchers and their communities. The group sets up a Science Discovery Station at the Minneapolis Midtown Farmer's Market on Saturdays to encourage exploration of a variety of topics in the natural sciences. I have served as the faculty advisor to this group since their start in 2014