Environment and Natural Resources Trust Fund
2018 Request for Proposals (RFP)

Project Title: **ENRTF ID: 124-C**

Market Science: Connecting Minnesotans with Environmental Research

Category: C. Environmental Education

Total Project Budget: $ 236,165

Proposed Project Time Period for the Funding Requested: 3 years, July 2018 to June 2021

Summary:

Market Science is a scientific education and outreach program that promotes dialogue between Minnesota's scientist and citizens through attractive visual displays and interactive demonstrations at Farmer's markets and county fairs.

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Sponsoring Organization: U of MN

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Location

Region: Statewide

County Name: Statewide

City / Township:

Alternate Text for Visual:

Displays, interactive activities, and focal topics including prairie conservation, water quality, lakes and hydrology, and healthy soils.

_____ 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 with Environmental Research

I. PROJECT STATEMENT

Our project directly connects Minnesotans with local research scientists through science exploration at local farmer's markets and community events. There are very few opportunities for most Minnesotans to engage with science in their day-to-day lives. Many young children are enthusiastic about nature, but lack opportunities to build upon their interests and become inspired to pursue careers in STEM (Science, Technology, Engineering, and Math). Careers in STEM have expanded more than twice as rapidly as other industries in Minnesota's growing economy. For adults, issues in STEM and the environment are often prominent in debates about state policy and legislation. Although citizens are aware of these issues, they are often disconnected from ongoing research and the scientists whose research informs public policy. ***Our project will not only provide unusual opportunities for Minnesotans to connect with cutting-edge research but will also allow scientists to hear directly from citizens about their priorities and concerns in an open two-way dialogue.***

The proposed project will connect our communities to environmental research, and environmental researchers to the people of Minnesota at informal community venues across the state. By bringing hands-on science activities to popular public locations, Minnesota scientists will engage with their communities *directly* in a relaxed setting. We are proposing to expand an already successful program called "Market Science" (marketsci.org) that brings scientists to farmers' markets, county fairs, and other public venues. 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, Bell Museum, Institute on the Environment), and research labs at local universities (U. St. Thomas, U of MN). These activities not only promote discussion between scientists and citizens, but also allow the public to engage with environmental research (especially that funded by LCCMR) that is exciting and relevant to them

Thus far, extensive efforts have been taken to develop engaging and relevant curricula and attract a variety of researchers to participate. The success of those modules has already been evaluated, providing direction for improvement and expansion. In 2016 we reached more than 4,000 Minnesotans throughthree farmers markets, the Ramsey County fair, and schools, and provided more than 50 local scientists with novel outreach opportunities. The program is well received and Market Science currently receives more invitations to appear at farmer's markets and county fairs than it can currently meet.

The proposed activities will directly serve children and adults throughout the state by allowing them to explore hands-on science. Additionally, Minnesota researchers and undergraduate and graduate students will have opportunities to communicate environmental research to non-scientists and learn how citizens of the state view scientific research. Specific activities will focus on a variety of topics including bees and other pollinators, aquatic and terrestrial invasive species, clean water, wildlife conservation, and restoration of native habitats such as Minnesota prairies.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: Science at the Market **Budget:** $ 126,165

Local researchers from Market Science (mostly volunteers) will host interactive hands-on science activities at the Mpls Midtown and Richfield Farmers Markets (a market with high visitation by members of groups that are underrepresented in STEM) for ca. 18 weeks each market season. We will also visit at least four other farmers markets in rural or small-town MN communities each summer. Visitors will learn from attractive visual displays and participate in interactive demonstrations. For example, visitors will engage with live plants and animals, learn how to use scientific instruments, and observe experiments. This combination of approaches will excite children as well as promote discussion between adults and the host scientists. Weekly 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.

Outcome	Completion Date
1. Present Market Science activities at Mpls Midtown and Richfield Farmers Markets	June 2021
2. Present Market Science activities at farmers markets throughout the state	June 2021

Activity 2: Science at the Fair **Budget:** $ 110,000

County and community fairs, as well as the State Fair, are natural environments for broadening the reach of Market Science and appearances at these fairs will enable Market Science to interact with a broader base of Minnesotans than can be reached during local farmers' markets. During 2016 Market Science successfully participated at the Ramsey County fair and for 2017 we already have committed to participate at the Ramsey, Olmsted, Beltrami, and Redwood County Fairs, the Northeast Minneapolis and West Broadway Open Streets Fairs, and the Minnesota State Fair. Each year we will assess the success of the interactive exhibits and use the results of these assessments 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 students, educators, and the public.

Outcome	Completion Date
1. Present Market Science activities annually at eight fairs throughout MN	June 2021
2. Create a free online database of Market Science lesson plans	June 2021

III. PROJECT STRATEGY

A. Project Team/Partners (the Team and Partners are all affiliated with the University of Minnesota).
Project Team: PIs (receive funding): Peter Tiffin, David Moeller, and Daniel Stanton. Project Partners (no funding): Mohamed Yakub (Stakman-Borlaug Center), Ryan Briscoe Runquist, John Benning, Elizabeth Fallon. Other Contributors: A diverse group of organizations are already involved in Market Science: Minnesota Zoo, USDA NRCS, Bell Museum, Healthy Prairies, Raptor 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 and informed researchers. The project will also develop an online resource of easy-to-implement 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 private foundations, in fact our success at the Midtown market in Minneapolis has already attracted a private donor who pays for the booth fees charged by that market.

C. Timeline Requirements

We are requesting support for 36 months, from July 2018 – June 20201. This support will allow us to make approximately 54 visits to regional farmers markets and 24 visits to county and community fairs, will employ one half-time educational specialist/post-doctoral scholar, two half-time graduate students, and more than 30 University of Minnesota undergraduate students.

2018 Detailed Project Budget

Project Title: Market Science: Connecting Minnesotans with Environmental Research

IV. TOTAL ENRTF REQUEST BUDGET *3* **years**

BUDGET ITEM	AMOUNT
Personnel: One postdoctoral coordinator who will participate in recruiting and training student participants, developing materails for presentations, participate in presenataitons, and provide oversight and management continuity. Budgeting is based on 50% of an annualfull-time salary of $48,000 with fringe of $10,272 and increased by 3% per year	$ 90,050
Each year 2 graduate students will be supported, each for the summer and for one semester of the academic year. During the summer the students will lead activities and travel to events across the state, as well as recruit and coordinate additional volunteer participants. Budgeting is based on current year costs ($10,045 stipend, $2,705 fringe, and $1,200 tuition per semester: $6,696 stipend and $1,005 fringe per summer), increased by 3% per year.	$ 102,615
Undergraduate students will participate in outreach training and then participate in market and fair outreach activities. Budgeting is for ten undergraduate students per year, each participating for an average of 60 hours at $15/hour. total $27,000	$ 27,000
Professional/Technical/Service Contracts:	NA
Equipment/Tools/Supplies: We are requsting $2,000 per year to pay for development of displays and expendable items associated with hands-on-activities.	$ 6,000
Acquisition (Fee Title or Permanent Easements): none	NA
Travel: Mileage (~3,000 miles / year), and lodging and meals for visits to fairs that are more than 200 miles from the Twin Cities	$ 7,500
Additional Budget Items: Space rental at Minnesota fairs and markets, $1000 / year.	$ 3,000
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND $ REQUEST =	$ 236,165

V. OTHER FUNDS

SOURCE OF FUNDS	AMOUNT	Status
Other Non-State $ To Be Applied To Project During Project Period: none	NA	
Other State $ To Be Applied To Project During Project Period: none	NA	
In-kind Services To Be Applied To Project During Project Period: Unrecovered indirect costs @ 54% of modified total direct cost base (graduate student fringe is excluded).	$ 123,535	*Secured*
Past and Current ENRTF Appropriation: none	NA	
Other Funding History: none	$ -	

market science

CONNECTING MINNESOTANS TO ENVIRONMENTAL RESEARCH

At the Market

7300 visitors over the past two seasons at three farmers markets

75 MN scientists sharing their research

50 new sessions for our 2017 season

Midtown Farmers Market

TOPICS INCLUDE:

PRAIRIE CONSERVATION water quality POLLINATORS wastewater management MN biodiversity healthy soils lakes and hydrology INVASIVE SPECIES

At the Fair

Hands-on science activities promoting sustainable, informed communities

I ♥ science

Local researchers visiting local, county, and state fairs across MN

ENRTF ID: 124-C

PROJECT TITLE: Market Science: Connecting Minnesotans with Environmental Research

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_2. While at the University of Minnesota I have been a principal investigator or co-principle 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