

**Environment and Natural Resources Trust Fund  
2016 Request for Proposals (RFP)**

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**Project Title:**

**ENRTF ID: 119-C**

Visualizing Flow: Education on Flow Sources to Rivers

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**Category:** C. Environmental Education

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**Total Project Budget:** \$ 39,647

**Proposed Project Time Period for the Funding Requested:** 3 years, July 2016 to June 2019

**Summary:**

Educate citizens on the timing of flow in ditches, ravines, tiles, fields, and rivers using trail cameras to link visuals to existing water quality and hydrology data using interactive hydrographs.

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**Name:** Ben Von Korff

**Sponsoring Organization:** Mankato State University - Water Resources Center

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**Location**

**Region:** Statewide

**County Name:** Statewide

**City / Township:**

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**Alternate Text for Visual:**

This map shows sites for installation of trail cameras at sources of flow - the Hwy 90 Ravine and tile sites, Beauford Ditch, city stormwater outflows, river sites (Big Cobb and Le Sueur), and a bluff erosion site

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



**PROJECT TITLE:** Visualizing Flow: Education on Flow Sources to Rivers

**I. PROJECT STATEMENT**

There is a need to increase public understanding of complex flow dynamics involved in the transportation of water from landscapes to rivers, and the resulting water quality impacts to rivers. We are seeking funding to educate citizens on sources of flow to rivers, using trail cameras to visually show the timing of flow in landscape sources (ditches, ravines, tiles, fields, stormwater), in rivers, and of bluff erosion in rivers, using interactive hydrographs to link the visuals to water quality and hydrology data measured through existing monitoring programs. Given a disproportionately high load of sediment and nutrients in the Minnesota River Basin, an informed public is critical for motivating locally-led water quality improvements at these key sources of flow. However, public knowledge can be limited because citizens are rarely present at flashy sources of flow such as ravines and ditches during short-lived hydrologic pulses during rain events. Bank/bluff erosion, a negative consequence of increased flow and a major sediment source in rivers, is also rarely observed because it occurs during a short time window. A common misconception that tile drainage reduces connectivity to rivers reflects a growing need to better explain to citizens the ways that flow is transported to rivers, and the consequences of increased flow. Visuals offer a convincing way to show citizens what is happening on the landscape and in rivers which they can relate to, provide them with an intimate connection to the problem, and assist them in making sense of water quality issues. The interactive hydrographs will show the timing and magnitude of flow from the landscape to rivers, and the link between landscape sources and pollutant transport and erosion in rivers.

Trail cameras will be installed at the following sites: ravine (Hwy 90 Ravine), tile drainage (tile flowing to Hwy 90 ravine, tile flowing to Beauford Ditch), agricultural fields (Discovery Farms BE1, overland flow to Beauford Ditch), ditch (Beauford Ditch), stormwater (city of Mankato stormwater outlet), rivers (Le Sueur River Hwy-66, Big Cobb River CR-16), and bluff/banks (Le Sueur River CR-8). Pictures will be taken frequently (hourly intervals) to explain the details of flow/water quality dynamics during rain events. Aerial imagery will be captured using a drone to provide a larger scale view of the monitored area. Where not already present, staff gauges will be installed as a reference for water levels in pictures. Water quality data will be obtained from the Big Cobb River, Le Sueur River, and Beauford Ditch from the Watershed Pollutant Load Monitoring Network (WPLMN), and at BE1 through the Discovery Farms programs. At most sites, flow data will be obtained from the MN Department of Natural Resources and MN Department of Agriculture (MDA), but a water level logger and area/velocity meter will be installed at the ravine to measure flow. Bank pins will be installed at the bluff site to document erosion. Interactive Hydrographs will be posted on the Minnesota River Basin Data Center and linked to the MN Pollution Control Agency (MPCA)/MDA websites. A training brochure will be distributed across the state, targeting impaired watersheds, to increase awareness of the website. A video discussing pollutant sources and showing imagery collected from trail cameras will be presented to citizens at 2 local watershed meetings (Le Sueur River Watershed Network, LRWN) and 2 statewide meetings, such as the Minnesota Water Resources Conference and MN River Congress.

**II. PROJECT ACTIVITIES AND OUTCOMES**

**Activity 1:** *Collect pictures from sources of flow to rivers for 2 years at 12 sites.*

**Budget: \$19,353**

Inspect sites to determine details of equipment setup, and install and maintain cameras and flow equipment. Capture pictures hourly from March-October and download pictures monthly. Capture aerial imagery (3 days annually). Download and organize flow data and water quality data.

Outcome	Completion Date
1. Collect pictures from 12 field sites to show citizens the timing and sources of flow in rivers over two years.	10/30/2018



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

**2016 Main Proposal**

**Project Title:** Visualizing Flow: Education on Flow Sources to Rivers

**Activity 2:** *Develop interactive hydrographs on the Minnesota River Basin Data Center, and distribute a brochure to provide education and increase awareness of website.* **Budget: \$17,922**

Develop website to show interactive hydrographs (hosted by the Minnesota River Basin Data Center). At the end of each monitoring season, enter water quality/flow data to create interactive hydrographs. Distribute an educational brochure on sources of flow to rivers to educate citizens and increase awareness of the website.

<b>Outcome</b>	<b>Completion Date</b>
1. Develop a website showing interactive hydrographs that educates citizens on sources of flow to rivers and reaches ~ 2,000 people.	12/1/2017
2. Distribute information about the website using online distribution methods (MN River Weekly Update, Watershed Network News, email lists), reaching ~ 500 people	2/1/2019
3. Distribute educational brochures in impaired watersheds across the state to provide education on the sources of flow and pollutants to rivers, and increase awareness of the website, reaching ~ 3,000 people	3/1/2019

**Activity 3:** *Develop educational video on sources of flow and present at local and state meetings.* **Budget: \$2,372**

Develop an educational video to show timing and sources of flow, and give a presentation with video at 2 local meetings (LRWN), and 2 statewide meetings (such as the Water Resources Conference and MN River Congress).

<b>Outcome</b>	<b>Completion Date</b>
1. Educate citizens on sources of flow to rivers using video and presentation at 2 LRWN meetings, and 2 statewide meetings, reaching ~ 300 people.	6/30/2019

**III. PROJECT STRATEGY**

**A. Project Team/Partners**

Project partners include the City of Mankato, the MDA, the MPCA, the National Center for Earth Dynamics (NCED), and the MSU-M Water Resources Center (WRC). The MPCA will provide data loggers, and assist with project planning and data analysis. The MDA will also assist with planning and data analysis, and coordinate use of MDA sites and existing data. NCED will provide rating curves for a ravine, and may supply an area/velocity meter. The Water Resources Center will develop interactive hydrographs on the Minnesota River Basin Data Center website, and assist with outreach and monitoring.

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

Once equipment is set up and the interactive hydrograph is developed, project costs will be much lower, increasing the likelihood we can continue monitoring after the 3<sup>rd</sup> year. The project will support long term monitoring projects such as WPLMN, and Discovery Farms program, by combining visual information with data collected through these projects. The City of Mankato will coordinate use of stormwater outflow site.

**C. Timeline Requirements**

This project is designed to obtain field data from 2 full field seasons to capture data at a variety of precipitation conditions. Monitoring will occur from March-October from 2017 - 2018.

## 2016 Detailed Project Budget

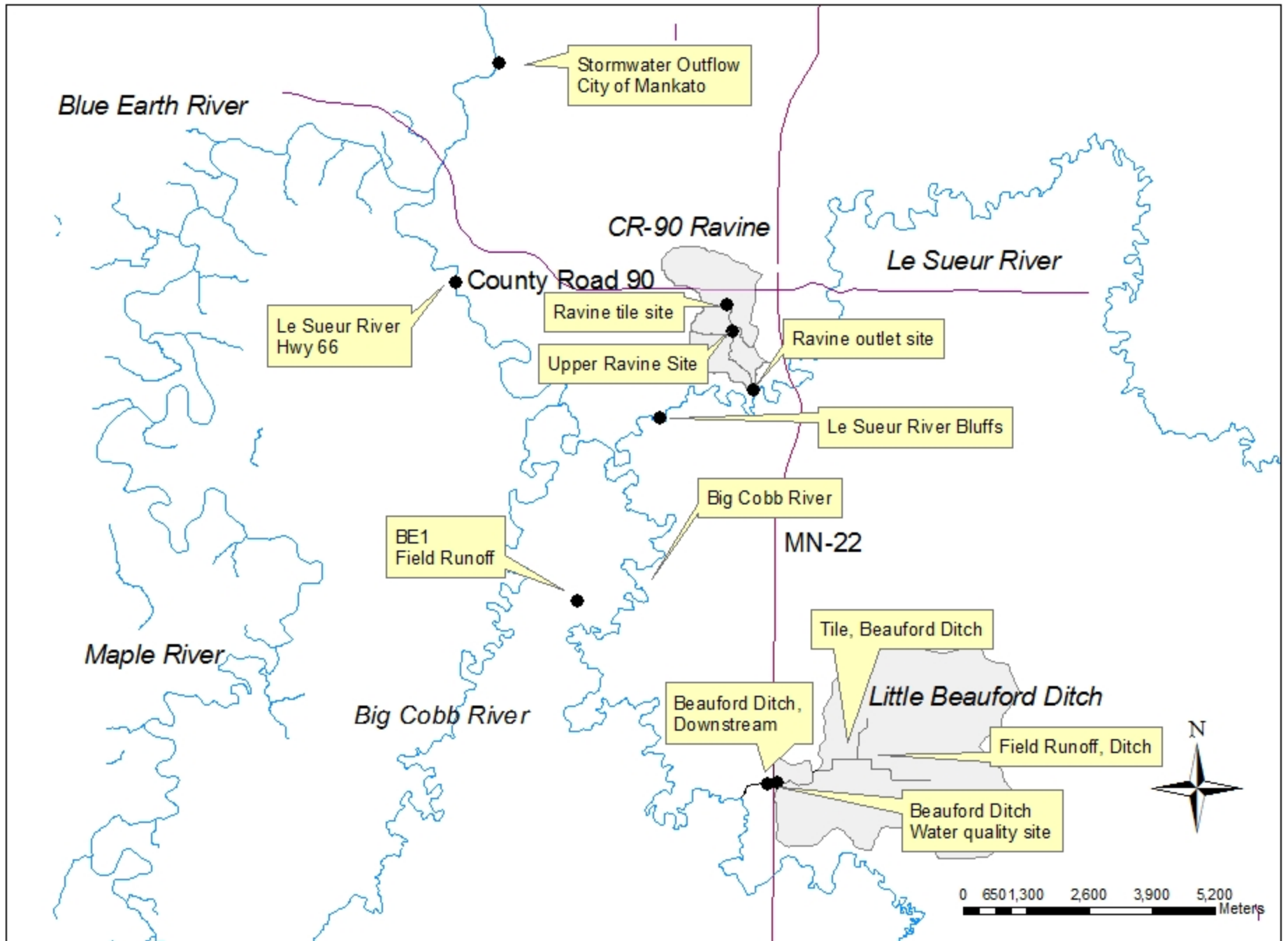
**Project Title: Visualizing Flow: Education on Flow Sources to Rivers**

### IV. TOTAL ENRTF REQUEST BUDGET 3 years

<u>BUDGET ITEM</u>	<u>AMOUNT</u>
<b>Personnel:</b>	\$ -
Water Quality Specialist, Ben Von Korff; role: equipment setup and maintenance, download pictures, data management: 16.14% FTE for 3 years; Salary=76%, Benefits=24%	\$ 8,655
Director, Shannon Fisher; role: provide project oversight; 13% FTE for 3 yrs; Salary=69%, Benefits= 31%	\$ 1,656
Office Manager, Diane Wiley; role: oversee budget/finances; 1.31% FTE for 3 yrs; Salary=75%, Fringe=25%	\$ 792
Outreach intern; role: present results at 4 technical meetings (during academic year) .38% FTE for one yr; Salary= 100%	\$ 480
Assistant Director, Kim Musser; role: oversee outreach and website development 11.24% FTE for 3 years; Salary=88.97%, Benefits=11.03%	\$ 7,056
Web development intern, role: develop interactive hydrographs for MNRBDC website 100 FTE for 2 years; Salary=87.86%, Benefits=12.14%	\$ 10,230
GIS specialist, Andrew Meyer; role: capture aerially drone imagery 5% FTE for 2 yrs; Salary=63.89%, Benefits=36.11%	\$ 2,443
<b>Equipment/Tools/Supplies:</b>	\$ -
Trail Camera (12 total) - used to obtain hourly pictures at field sites	\$ 1,200
Solar Panels (12 total) - supply power to cameras	\$ 720
Staff gauges (6 total) - for visual of water level	\$ 455
Estimated equipment repair/replacement costs	\$ 800
Rebar pins and caps - measure erosion at Le Sueur River bluffs	\$ 29
Post, nuts, bolts - to install water level loggers, cameras, and staff gauges	\$ 50
3 Tb hard drive - for storing pictures on a computer	\$ 60
Brochures (3,000 copies)	\$ 500
Shipping brochures	\$ 1,000
64 Mb memory cards (12 total)- for storing pictures on cameras	\$ 360
<b>Travel:</b>	\$ -
Equipment setup and removal - 6 days, total	\$ 510
Visit sites to check on equipment function and download pictures (20 days annually)	\$ 2,120
Travel for two outreach meetings	\$ 212
Field work to obtain aerial imagery - 3 annual field trips	\$ 318
<b>TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =</b>	<b>\$ 39,647</b>

### V. OTHER FUNDS

<u>SOURCE OF FUNDS</u>	<u>AMOUNT</u>	<u>Status</u>
<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>	\$ -	
National Center for Earth Dynamics - provide an area velocity meter for ravine	\$ 4,500	<i>pending</i>
MPCA - supply water level logger, pressure transducer for ravine	\$ 1,500	<i>secured</i>
<b>Funding History:</b>	N/A	
<b>Remaining \$ From Current ENRTF Appropriation:</b>	N/A	



## **Water Resources Center, Minnesota State University, Mankato (WRC, MSU-M)**

<http://cset.mnsu.edu/wrc/about/aboutus.html>

In 1987 the WRC was created to serve as a regional center for gathering, interpreting, and distributing data of environmental significance. Faculty and students accomplish these tasks through applied research, educational programming, technical assistance, and water resource planning. In addition, we have GIS staff with the capacity to create sophisticated GIS analysis and maps and 3-dimensional landscape visualization. Using the latest data, the WRC works with citizens within the Minnesota River Basin to enhance the quality of regional lakes, rivers, wetlands, and groundwater.

Since its beginning, the WRC has participated in over 100 research, educational, and planning projects involving partnerships with dozens of public and private organizations. These projects range from groundwater, lake assessment, and TMDL studies to citizen engagement and water quality workshops, to the development of watershed-based plans for surface water quality protection. Our stability since 1987 stands as a testament to the objective and quality products we produce. Long-term partnerships with counties, nonprofit organizations, and state agencies have resulted in many important and far-reaching land and water resource initiatives. We have a dedicated staff and look forward to enhancing the public's understanding and connection with water resources in the region.

***Project Manager: Ben Von Korff, Water Quality Specialist, WRC***

B.S. Biology, University of WI, Madison (2007)

M.S. Marine Sciences, University of NC, Chapel Hill (2011)

- Water quality monitoring: Ben monitors water quality in Greater Blue Earth River Basin through Watershed Pollutant Load Monitoring Network (Minnesota Pollution Control Agency), and measures water levels in the Mount Simon Aquifer through a 7-partner monitoring program in the aquifer. Ben led sampling for a WRC Surface Watershed Assessment Grant (Minnesota Pollution Control Agency) in the Watonwan River during 2014, and assisted with sampling for sediment fingerprinting research in collaboration with Utah State University and the University of Minnesota. Ben has supervised 3 students interning with the WRC – training students in water quality monitoring and research is a key component of the WRC.
- Publications: Von Korff BH, Piehler MF, and Ensign SH. 2014. Comparison of Denitrification Between River Channels and Their Adjoining Tidal Freshwater Wetlands. *Wetlands*: 34(6). 1047-1060.