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

Project Title: **ENRTF ID: 082-B**

Hydrologic Trends: Identify, Manage and Adapt

Category: B. Water Resources

Total Project Budget: $ 682,000

Proposed Project Time Period for the Funding Requested: 2.5 years, July 2016 to October 2018

Summary:

Identify watershed most impacted by altered doxology and evaluate an array of scenarios to restore hydrology for cost, compatibility, and effectiveness.

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Sponsoring Organization: Freshwater Society

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Excelsior MN 55331

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Web Address www.freshwater.org

Location

Region: Statewide

County Name: Statewide

City / Township:

Alternate Text for Visual:

Attached map shows US Geological Survey river gauging locations which will be analyzed.

_____ Funding Priorities _____ Multiple Benefits _____ Outcomes _____ Knowledge Base

_____ Extent of Impact _____ Innovation _____ Scientific/Tech Basis _____ Urgency

_____ Capacity Readiness _____ Leverage _____ TOTAL _____%

PROJECT TITLE: Hydrologic Trends: Identify, manage and adapt

I. PROJECT STATEMENT

The volume and character of flow in Minnesota's rivers have changed over time. Increased flows and peak flows increases erosion of farm fields and stream banks into private and public properties. This can lead to poor water quality, loss of habitat and reduced agricultural productivity.

This study will consist of three parts. In Part I, the U.S. Geological Survey (USGS) will build on previous studies to update trends in streamflow state wide. USGS will use statistical and analytical methods to investigate the relationship between changes in streamflow and climate variations, land-use changes, and other factors. These data and interpretations will be published in a readily accessible interactive online format.

In Part II, the Freshwater Society and Science Museum of Minnesota will compile adaptation and mitigation scenarios in targeted watersheds. Watersheds will be selected based upon streamflow changes and the likelihood they will offer transferable lessons. Scenarios will be evaluated for cost, compatibility, and effectiveness at restoring altered hydrology. Adaptation and mitigation practices identified may include temporary water storage, changes to public infrastructure, alternative cropping systems, and managed drainage.

In Phase III, the Freshwater Society will use this information to develop recommendations and a plan to position Minnesota to implement the adaptation and mitigation strategies.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: Determine statewide trends in streamflow including annual average flows and seasonal and episodic variations in peak flows. Determine where changes in climate, land-use, and other factors explain trends in streamflow. **Budget: $ 261,400**

Outcome	Completion Date
1. Compile stream gage information and climate data from across the state where records of greater than 30 years are available	December 2016
2. Describe changes in streamflow trends across the state	July 2017
3. Determine the magnitude of changes explained by climate, land-use, and other factors.	September 2017
4. Determine relative magnitudes those changes across the state.	March 2018
5. Publish a paper and produce an interactive web-mapper.	June 2018

Activity 2: Develop adaptation and mitigation scenarios to restore partial or full historic streamflow in targeted watersheds. Assess their effectiveness and cost. **Budget: $ 298,300**

Outcome	Completion Date
1. Develop adaptation and mitigation scenarios. Document methodology and compile GIS data	December 2017
2. Select targeted watersheds	January 2018
3. Assessment of the effectiveness and costs of scenarios.	May 2018
4. Final revisions and technical memo	September 2018

Activity 3: Evaluate adaptation and mitigation scenarios for feasibility and impacts. Make recommendations for modifications to physical, governmental and financial systems to achieve progress. **Budget: $ 122,300**

Outcome	Completion Date
1. Evaluate adaptation and mitigation scenarios for impacts and feasibility	May 2018

2. Develop recommendations to accelerate implementation of adaptation and mitigation scenarios	June 2018
2. Compile comprehensive review and recommendations into a final report	October 2018

III. PROJECT STRATEGY

A. Project Team/Partners:

The project will be led by Darrell Gerber, Research and Policy Director, at Freshwater Society with additional support by Steve Woods, Executive Director. Project partners will be USGS (John Bumgarner, Dave Lorenz, and Jared Trost), Science Museum of Minnesota (Shawn Shottler), and University of Minnesota (William Lazarus and David Mulla). Additional contract work via Freshwater Society will be provided by Rebecca Kluckhohn and Joel Toso.

B. Project Impact and Long-Term Strategy

The effects of climate variability and land-use changes on streamflow are increasingly noted by water-resources managers. However, trends in statewide annual average flows as well as seasonal and episodic variations in peak flows are not well understood and the causative factors are difficult to separate. This project will fill a critical void by looking at statewide streamflow changes, where they are occurring, and the degree that climate variations and land-use changes drive those changes.

The project will go beyond identifying the problem of altered streamflow to develop and evaluate possible adaptation and mitigation scenarios in a number of targeted watersheds. The costs and feasibility of corrective measures will be evaluated and a series of recommendations made on how best to achieve the scenarios.

The project will provide a package that local water managers, decision makers and the public will find informative and useful. They will be provided a richer understanding of how streamflow has changed across the state and the degree to which those changes are attributed to climate variations and land-use changes and recommendations on what steps can be taken to address these problems.

C. Timeline Requirements

The project will run from July 2016 through October 2018. Streamflow data compilation will be completed in the first year of the study as will development of adaptation and mitigation scenarios and analysis methodologies. Streamflow data analysis and interpretation and report preparation will be completed during the second year of the study. Selection of target watersheds and evaluation of adaptation and mitigation scenarios will be completed in the second year. Evaluation of scenario feasibility and recommendations for implementation will be developed as the analysis of scenarios proceeds. Final reports and manuscripts will be submitted by November 2018.

2016 Detailed Project Budget

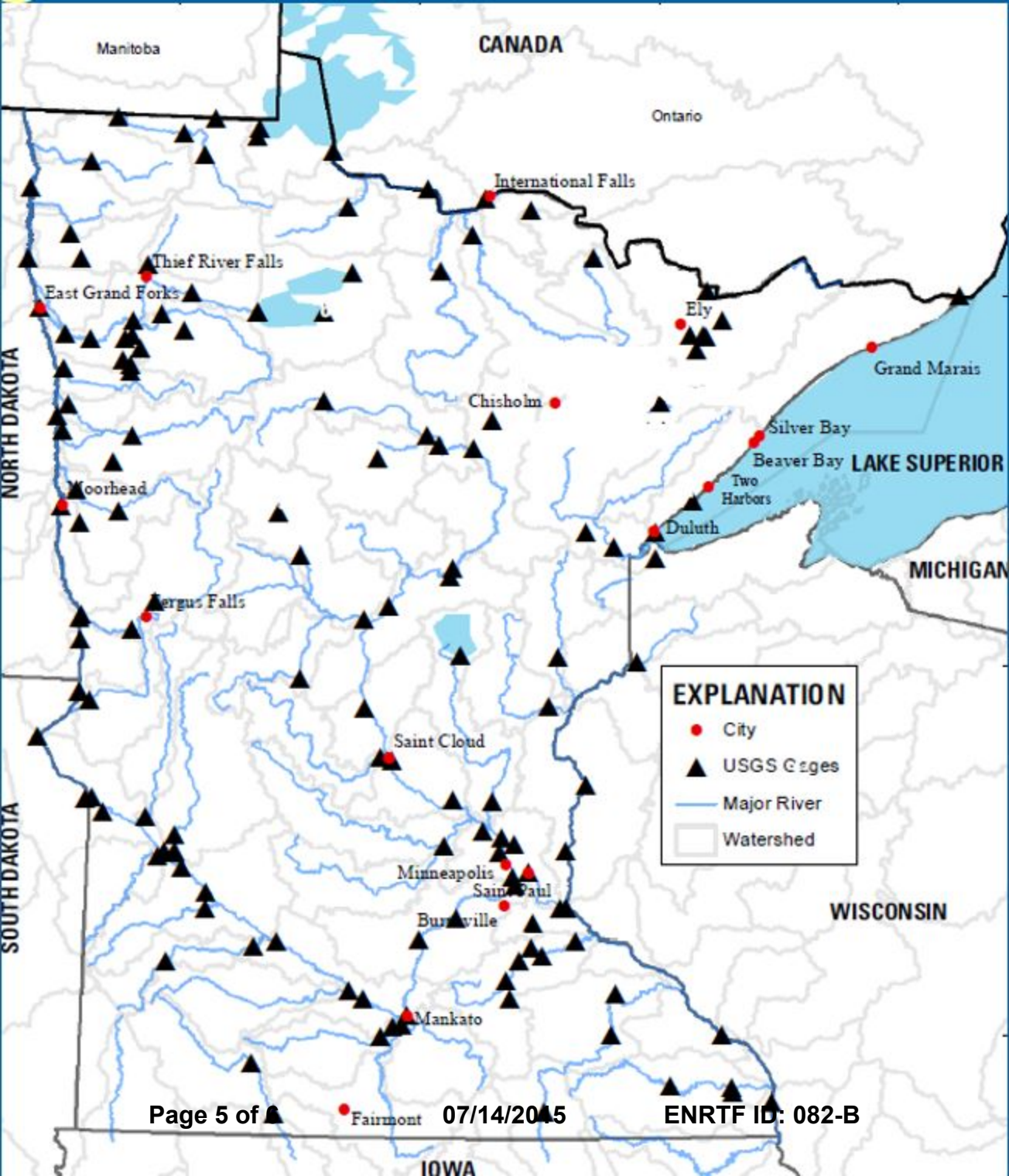
Project Title: Hydrologic trends: identify, manage, and adapt

IV. TOTAL ENRTF REQUEST BUDGET *[Insert # of years for project]* **years**

BUDGET ITEM	AMOUNT
Personnel:	$ -
Darrell Gerber, project manager Freshwater Society (80%salary, 20% benefits) ; 10% FTE in year 1, 40% year 2, and 45% year 3.	$ 95,000
Steve Woods, Freshwater Society (80% salary, 20% benefits); 5% FTE in year 1, 10% year 2, 15% year 3.	$ 44,000
Professional/Technical/Service Contracts:	$ -
US Geological Survey flow data analysis and web-mapping	$ 240,000
Science Museum of MN statistical collaboration , alternative management scenario team	$ 30,000
Rebecca Kluckhohn and Joel Toso professional watershed services for testing alternative management scenarios	$ 223,000
University of MN agricultural economic impacts and practice compatibility input	$ 50,000
Additional Budget Items:	$ -
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND $ REQUEST =	$ 682,000

V. OTHER FUNDS

SOURCE OF FUNDS	AMOUNT	Status
Other Non-State $ To Be Applied To Project During Project Period: McKnight Foundation	$ 80,000	*Pending*
Other State $ To Be Applied To Project During Project Period:	$ -	
In-kind Services To Be Applied To Project During Project Period: *Freshwater Society administration & office support*	$ 10,000	*secured*
Funding History: - ENRTF for ML 2009-B1-038: Intensified tile drainage evaluation	$ 300,000	
Remaining $ From Current ENRTF Appropriation:	$ -	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FRESHWATER SOCIETY

Gray Freshwater Center

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Freshwater Society is a non-profit organization dedicated to educating and inspiring people to value, conserve and protect all freshwater resources.

#6 Project Manager Qualification & Organization Description

Darrell Gerber, Project Lead and Research and Policy Director
Gerber is the Research and Policy Director at the Freshwater Society, where he oversees initiatives in public policy and special topics on key water issues. Prior to joining Freshwater in August 2014, he was at Clean Water Action from 2007 to 2014 as the Water Program Coordinator working on a variety of issues including the Great Lakes, agricultural water pollution, drinking water, invasive species, and budget issues. He studied Aerospace and Mechanical Engineering at Colorado State University, North Carolina State University and Georgia Institute of Technology and attended the Humphrey Institute at the University of Minnesota to study Science, Technology and Environmental Policy in 2005 and 2006.

Organizational Description
The mission of the Freshwater Society is to promote the conservation, protection and restoration of all freshwater resources. Since 1968, the Freshwater Society has been a leading public nonprofit organization dedicated to conserving, restoring, and protecting freshwater resources and their surrounding watersheds. To achieve this goal, our organization utilizes scientific findings and good ideas from around the country to:

- Recognize the vital role of freshwater to all living things and the impending crisis in the quantity and quality of accessible freshwater.
- Dedicate its experience and resources to activities that lead to the understanding, protection, enhancement, and restoration of freshwater resources.
- Invite the participation and support of individuals, associations, business and industry, institutions, educators, and government in these activities.