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

Project Title: **ENRTF ID: 043-B**

Hydroacoustic Monitoring to Understand Sediment Impacts - Phase 2

Category: B. Water Resources

Total Project Budget: $ 328,640

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

Summary:

Installation of streamgage web cameras and development of an online real-time sediment network maximizes sediment monitoring efforts of several agencies and better disseminates collected information to the general public.

Name: Joel Groten

Sponsoring Organization: U.S. Geological Survey

Address: 2280 Woodale Drive

Mounds View MN 55112

Telephone Number: (763) 783-3149

Email jgroten@usgs.gov

Web Address http://mn.water.usgs.gov/index.html

Location

Region: Central, Metro, Southwest, Southeast

County Name: Anoka, Big Stone, Blue Earth, Carver, Chippewa, Chisago, Dakota, Goodhue, Hennepin, Isanti, Lac qui Parle, Le Sueur, Nicollet, Ramsey, Redwood, Renville, Scott, Sherburne, Sibley, Wabasha, Washington, Wright, Yellow Medicine

City / Township:

Alternate Text for Visual:

Map of hydroacoustic streamgages used in the proposed study.

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

PROJECT TITLE: Hydroacoustic Monitoring to Understand Sediment Impacts – Phase 2

I. PROJECT STATEMENT

WHY: Sediment is the top impairment in Minnesota, and excessive sediment costs the State of Minnesota millions of dollars each year. In 2015, the ENRTF funded a U.S. Geological Survey (USGS) study (Phase 1) to install hydroacoustic monitors that improve the accuracy of measured sediment loads. Phase 2 can increase the utility of collected sediment information, make sediment information publicly available in real-time, and provide the foundation for a statewide sediment network.

GOALS: 1) Increase utility of existing monitors for resource managers responsible for improving water quality
2) Increase accessibility of water clarity information that the public can use to plan recreation activities
3) Build a foundation for a statewide, real-time sediment network

HOW: We will collect the additional data required to provide real-time sediment information for 7 hydroacoustic streamgages through a USGS web portal. Webcams will be installed at 5 locations. This study will build on the existing (Phase 1) study funded by ENRTF and supplement existing USGS efforts funded by other partners:

- Hydroacoustic streamgages for Phase 2 were installed in 2015 using ENRTF funds as part of Phase 1.
- In 2017, the Minnesota Pollution Control Agency (MPCA) is funding upgrades to equipment that make hydroacoustic streamgages capable of transmitting real-time sediment information.
- The U.S. Army Corps of Engineers and Lower Minnesota River Watershed District have contributed funds to support development of real-time sediment information for the Minnesota River at Fort Snelling State Park.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: Install webcams, identify data gaps from the 2016-17 sampling efforts, collect and analyze additional sediment samples, quality check and enter data into database. **Budget: $258,640**

Activity 1 Outcomes	Completion Date
1. Webcams provide a nontechnical means of evaluating real-time flow conditions	October 1, 2018
2. Filling data gaps improves data accuracy throughout the entire hydrograph	November 30, 2019
3. Data quality checks ensures the accuracy of public information	June 30, 2020

Activity 2: Publish continuous, real-time sediment information in a USGS web portal. **Budget: $70,000**

Activity 2 Outcomes	Completion Date
1. Managers can make informed decisions about actions impacting water quality	June 30, 2021
2. The public gets a simple way to evaluate river conditions for recreation activities	June 30, 2021
3. The foundation for a statewide, real-time sediment network is established	June 30, 2021

III. PROJECT STRATEGY

A. Project Team/Partners

Principal investigators receiving ENRTF funds:

- Joel Groten and Jeff Ziegeweid - USGS Minnesota Water Science Center: role is **receiving ENRTF funds** for sample collection, equipment maintenance, data analyses and management, and website design. Another role is to **provide USGS Cooperative Water Program funds that cover USGS indirect costs.**

Other project partners NOT receiving ENRTF funds:

- Greg Johnson – Minnesota Pollution Control Agency: role is to contribute funds to upgrade in 2017 and providing additional funds to support data collection and analyses and to **help cover USGS indirect costs**.
- Jon Hendrickson – U.S. Army Corps of Engineers: role is to contribute funds that support data collection and analyses for Minnesota River at Fort Snelling State Park and to **help cover USGS indirect costs**.
- Linda Loomis – Lower Minnesota River Watershed District: role is to contribute funds to support data collection and analyses for Minnesota River at Fort Snelling State Park and to **help cover USGS indirect costs**.

B. Project Impact and Long-Term Strategy

The 7 hydroacoustic streamgages that will be operated in Phase 2 are listed in the included Phase 1 map. Mississippi River at St. Paul and St. Croix River at Prescott sites were included in Phase 1 but will be excluded in Phase 2 because we feel the operating costs outweigh the benefits provided by the data collected at these sites. Webcams will be installed at the Mankato, Jordan, Fort Snelling, Red Wing, and Lake City sites.

Phase 2 would provide the information required to turn an existing network of hydroacoustic monitors into a fully functioning real-time sediment network. In addition, Phase 2 would accelerate the process of making the real-time sediment network operational because other smaller projects typically can only fund one site at a time. Phase 2 will focus on the Minnesota and Mississippi Rivers, and once the network is functional, the long-term strategy is to maintain the network with support from previously listed partner agencies. However, completion of Phase 2 also will provide a foundation for establishing a statewide sediment network. Long-term, we plan to use the results of Phase 2 to attract additional partners and expand the sediment network statewide.

Real-time sediment information has many applications that would impact long-term management of sediment issues in Minnesota, including:

- Allowing resource managers to make real-time decisions about dynamic land and water management actions that directly affect water quality.
- Determining how quickly Lake Pepin is filling with sediment: Lake Pepin drains 47% of the land area in Minnesota, and Phase 2 includes sites directly above and below Lake Pepin.
- Refining MPCA Total Maximum Daily Load (TMDL) estimates for suspended sediment and nutrients.
- MPCA making recommendations for the Watershed Restoration and Protection Strategies (WRAPS) program.
- Prioritizing locations for stream restoration.
- Determining how effective completed restorations are at improving water quality in rivers.
- Evaluating likelihood of scour damage to bridges and risks to public safety during floods.
- Forecasting and mitigating risks to commercial navigation channels.
- More efficient overall management of dredging operations in commercial navigation channels.
- Forecasting and mitigating threats to aquatic life from storm-based pulses of high sediment loads.
- Improving aquatic ecosystem quality and increasing resiliency to changes in land use and climate.
- Providing data at appropriate spatial and temporal scales to evaluate long-term trends in sediment data and compare trends to changes in land use and climate change.

Real-time webcams provide several benefits, including:

- Allowing scientists and resource managers to visualize conditions at a site and remotely determine causes of anomalies in collected data.
- Providing the public nontechnical means to evaluate river conditions when planning recreational activities
- Using a nontraditional media format to engage a wider audience
  - Streamgage websites have counters to monitor the number of visits, so we can determine if website traffic increases following installation of webcams

C. Timeline Requirements

This project would run from July 2018 through June 2021. Fieldwork would be completed by November 2019. Two full field seasons are needed to verify the relationships from the previous study. Laboratory analyses of collected will be completed by June 2020. Sample analyses will be completed by the USGS Iowa sediment laboratory. A State laboratory will not be used, for a couple reasons. First, the USGS has strict requirements for laboratory techniques, quality control procedures, and metadata reporting in order to publish publicly available data. Second, using a USGS laboratory streamlines the process of entering laboratory results into the USGS database, making this the most cost-effective laboratory option. The total time needed to have the real-time, continuous sediment network fully functional will be 36 months.

2018 Detailed Project Budget

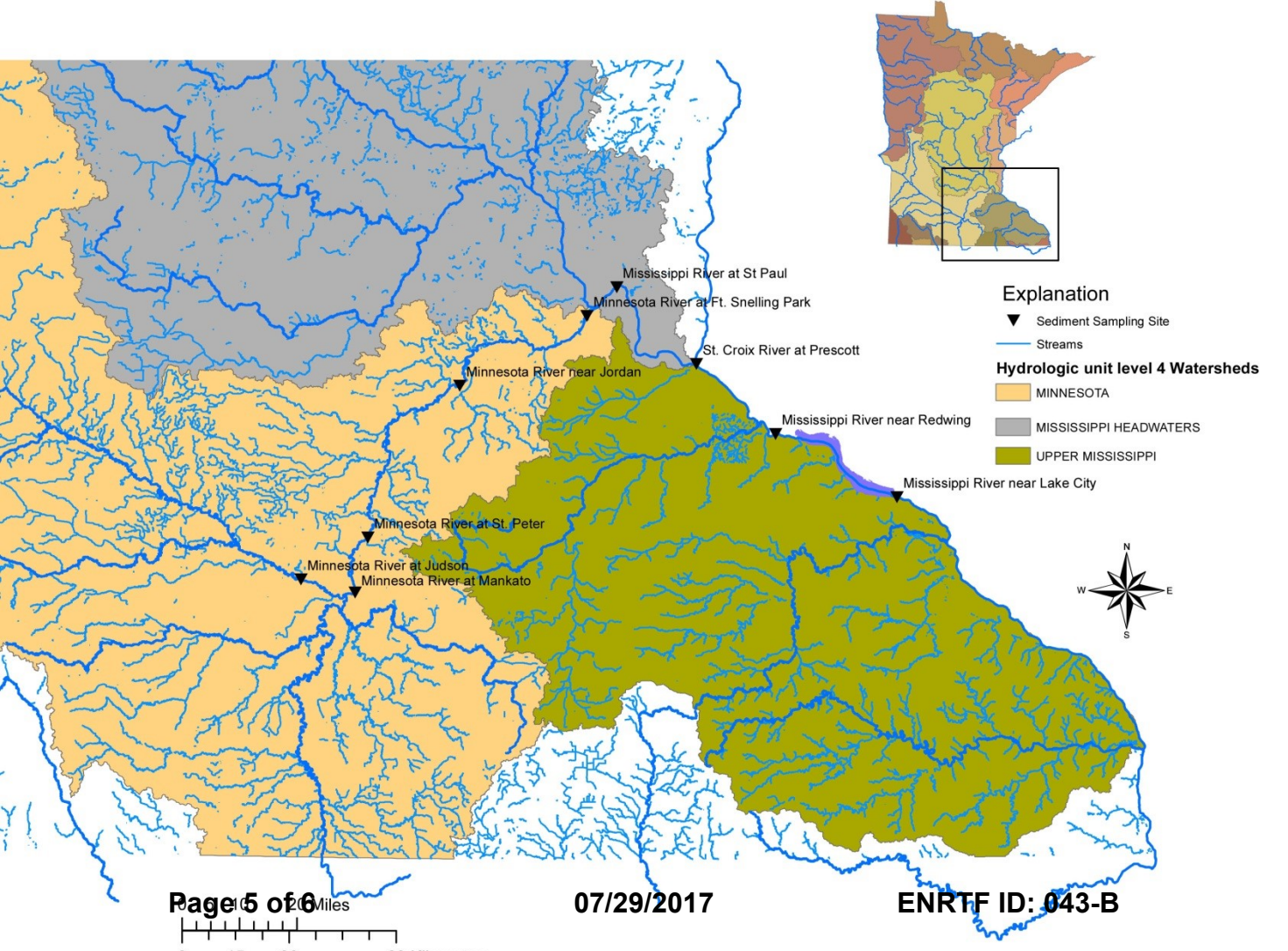
Project Title: Hydroacoustic Monitoring to Understand Sediment Impacts – Phase 2

IV. TOTAL ENRTF REQUEST BUDGET: 3 years

BUDGET ITEM	AMOUNT
Personnel (Salaries are paid by soft-money and are not covered by Federal appropriations):	
1 USGS Hydrologist/Project Manager (65% salary, 35% benefits); 33% FTE for 2 years, salaries are covered by "soft money".	$ 70,000
2 USGS Hydrologic Technicians (65% salary, 35% benefits); 60% FTE each for 2 years, salaries are covered by "soft money".	$ 215,640
Professional/Technical/Service Contracts:	
Sediment samples laboratory analyses: USGS sediment laboratory, $100 per sample, required to use this specific laboratory because it meets USGS policy mandates for USGS National Water Information System database in most cost-effective way.	$ 15,000
Equipment/Tools/Supplies:	
Miscellaneous streamgage and sampling equipment - replace as needed because of equipment failure, natural hazards, or vandalism. Variable speed drive-reel (1 at $8,466), E-reel to be used with drive-reel (1 at $2,686), safety belt guard (1 at $316), voltage conditioner (4 at $752 total), solar panel 100 watt (3 at $777 total), Sunsaver charge controller (3 at $150 total), cables (3 at $195 total), mount (3 at $228 total), enclosure (1 at $335), sampling bottles (100 at $200 total), crates to hold sampling bottles (34 at $340 total), bottle lables ($120), sampling bags and nozzles ($165), write in rain paper ($80), and hardware (nuts, bolts, washers, flanges, pvc, etc) ($190).	$ 15,000
Travel:	
In-state collection of sediment samples and maintenace of hydroacoustic streamgages: vehicle fuel plus additional vehicle maintenance costs; boat fuel plus additional boat mainteance costs.	$ 13,000
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND $ REQUEST =	$ 328,640

V. OTHER FUNDS

SOURCE OF FUNDS	AMOUNT	Status
Other Non-State $ To Be Applied To Project During Project Period:		
USGS Cooperative Matching Funds: federally-appropriated dollars **used to cover indirect costs.**	$ 130,160	Secured
U.S. Army Corps of Engineers: federal funds **used to cover indirect costs and** contribute to the hydroacoustic streamgage on the Minnesota River at Fort Snelling State Park ($15,000/year).	$ 30,000	Secured
Lower Minnesota River Watershed District: funds **to cover indirect costs and** contribute to the hydroacoustic streamgage on the Minnesota River at Fort Snelling State Park ($8,400/year).	$ 16,800	Secured
Other State $ To Be Applied To Project Before Project Period:		
Minnesota Pollution Control Agency: state funds applied to equipment purchase in 2017. These funds will be used to purchase 5 dataloggers, 5 wireless modems, and 5 webcams.	$ 32,000	Secured
In-kind Services To Be Applied To Project During Project Period:		
Minnesota Department of Natural Resources Water Division: co-location of USGS hydroacoustic equipment at 2 MDNR-operated streamgages at no additional cost to USGS. Each gage operated for 2 years at $10,000 per gage per year.	$ 40,000	Secured
Past and Current ENRTF Appropriation:		
M.L. 2015, Chp. 76, Sec. 2, Subd. 04g: planning to spend $82,657 in 2017 and $33,000 in 2018.	$ 115,657	Unspent
Other Funding History:		
USGS Cooperative Matching Funds for M.L. 2015, Chp. 76, Sec. 2, Subd. 04g: federally-appropriated dollars used for indirect costs that will be spent by July 2018.	$ 20,800	Secured


Mississippi River at St Paul
Minnesota River at Ft. Snelling Park
St. Croix River at Prescott
Minnesota River near Jordan
Mississippi River near Redwing
Mississippi River near Lake City
Minnesota River at St. Peter
Minnesota River at Judson
Minnesota River at Mankato
Explanation
Sediment Sampling Site
Streams
Hydrologic unit level 4 Watersheds
MINNESOTA
MISSISSIPPI HEADWATERS
UPPER MISSISSIPPI
N
W
E
S
0
15
30
60 Kilometers

PROJECT MANAGER QUALIFICATIONS AND ORGANIZATION DESCRIPTION

Joel Groten is a Hydrologist with the Minnesota U.S. Geological Survey (USGS) Water Science Center. He has a M.S. in Water Resources Science from the University of Minnesota. Joel serves as a project chief related to USGS sediment studies. In this capacity, he provides project oversight, technical assistance, and data analysis and reporting in support of sediment projects for the Minnesota Pollution Control Agency, Minnesota Department of Natural Resources, U.S. Army Corps of Engineers, Lower Minnesota Watershed District, and Rice Creek Watershed District. These projects vary in scope and relate fluvial sediment to aquatic habitat, TMDL studies, stream restoration, geomorphology, sediment budgets, and flood retention and diversion. Joel also is responsible for research and implementation of new technologies to improve understanding of sediment sources, fate, and transport mechanisms.

The **USGS** works as a partner with state agencies towards collecting and analyzing myriad water quality data. The USGS is uniquely positioned to carry out the work for this project through its operation of the statewide stream gaging network, specialized sediment sampling equipment, and experienced hydrologists and hydrologic technicians. The USGS in Minnesota has state-of-the-science GIS expertise in the office and has access to the most current science and technology related to sediment research from USGS scientists nationwide.