

**Environment and Natural Resources Trust Fund
2011-2012 Request for Proposals (RFP)**

LCCMR ID: 041-B

Project Title: Quantifying Streambed Sediment to Improve Aquatic Habitat

Category: B. Water Resources

Total Project Budget: \$ \$450,000

Proposed Project Time Period for the Funding Requested: 3 yrs, July 2011 - June 2014

Other Non-State Funds: \$ 300,000

Summary:

Streambed sediment assessment and quantification will help define the impacts of sediment on fish and other aquatic life and guide stream restoration efforts in Minnesota's rivers and streams.

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Sponsoring Organization: Minnesota Pollution Control Agency

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Location

Region: Statewide

Ecological Section: Statewide

County Name: Statewide

City / Township:

<input type="checkbox"/> Funding Priorities	<input type="checkbox"/> Multiple Benefits	<input type="checkbox"/> Outcomes	<input type="checkbox"/> Knowledge Base
<input type="checkbox"/> Extent of Impact	<input type="checkbox"/> Innovation	<input type="checkbox"/> Scientific/Tech Basis	<input type="checkbox"/> Urgency
<input type="checkbox"/> Capacity Readiness	<input type="checkbox"/> Leverage	<input type="checkbox"/> Employment	<input type="checkbox"/> TOTAL _____%

PROJECT TITLE: Quantifying Streambed Sediment to Improve Aquatic Habitat

I. PROJECT STATEMENT

Minnesota must address erosion, sediment transport, and the effects of sediment on water resources in a comprehensive fashion to quantify the impact of excess sediment on Minnesota streams. Information about streambed sediment remains a critical need in developing an understanding of what constitutes healthy streams in Minnesota. Sediment transported along the streambed is called bedload. It represents sediment transported in the river along an area up to four inches off the streambed that is not measured during standard suspended sediment sampling. Bedload can represent 10 to 75 percent of the total sediment load in a river and is a principal cause of degraded aquatic life in streams and rivers.

The measurement of bedload and bed sediment has often been ignored because of the cost and difficulty to measure. Much of the difficulty in bedload sampling is due to the intrusive shape and size of bedload samplers which cause the river bottom to be disturbed when being sampled. The U.S. Geological Survey (USGS) recently developed an innovative method to measure bed sediment effectively and safely using Acoustic Doppler technology (use of sound waves in a way similar to the use of hand-held radar for measuring speed). This project will measure bedload and bed sediment using the new technique at several impaired rivers to provide a better understanding of the impact of bed sediments on aquatic life and stream stability.

Bedload data from this project will provide better and more detailed information regarding the extent and movement of bottom sediments in streams. This information will then be used in watershed modeling, stressor identification for aquatic life, characterization of stream stability, and identifying appropriate implementation activities to control bedload and stream stability problems in stream restoration projects. It will also provide important information for navigation channel dredging and flood mitigation structure operation and maintenance. In conjunction with suspended sediment and biological monitoring, the work will provide a framework to provide the needed data for other watersheds at a much lower cost, and yet provide for more detailed analysis of changes in bedload with stream flow changes.

The importance of bedload sediment information in watershed restoration project decision-making has created the opportunity and need for this project.

II. DESCRIPTION OF PROJECT ACTIVITIES

Activity 1: Sediment Sampling and Lab Analysis Budget: \$ 310,000

Ten monitoring sites will be selected from current USGS flow gaging sites across Minnesota. Sediment sampling at each site will include bedload, bed material, and suspended sediment. Five samples from each site will be collected each year for two years. All samples will be analyzed by USGS laboratories.

Outcome	Completion Date
1. Sampling equipment rented and USGS staff trained in use of equipment	February 2012
2. Sampling completed	October 2013
3. Lab analysis of samples completed	December 2013

Activity 2: Data Analysis and Reporting Budget: \$ 140,000

Data collected will be formatted, checked for errors, and stored in USGS databases. Data analyses will be completed to characterize sediment amounts and particle sizes being transported through each site,

compare sediment loads and characteristics between sites, and develop procedures in which to apply the results to other rivers in the state. The data will also be used in running stream restoration and sediment transport models.

Outcome	Completion Date
1. Data formatting, quality control, and database entry	February 2014
3. Completion of data analyses	April 2014
4. Application of results and development of procedures for other rivers	June 2014

III. PROJECT STRATEGY

A. Project Team/Partners

The project team includes staff from the Minnesota Pollution Control Agency (MPCA), USGS, and Minnesota Department of Natural Resources (DNR). Individuals responsible for the project include:

Gregory Johnson, MPCA – Project manager – manage contracts, reporting, and project team coordination

Christopher Ellison, USGS – Principal investigator – lead project design, direct monitoring and data analysis activities, and provide lead in development of project products

USGS staff – field monitoring, equipment operation and maintenance, data analysis, and technical reporting

MPCA and DNR staff – assistance in project design, monitoring site selection, field activities, and development of project products

In addition to the MPCA and the DNR, a project advisory committee will be convened to aid in the development and dissemination of project results applicable to each member’s need. The advisory committee will include staff from the MPCA, DNR, Minnesota Board of Water and Soil Resources, U.S. Corps of Engineers - Minnesota District, and selected watershed districts.

B. Timeline Requirements

The project is designed to be completed in three years. Given that sediment transport is usually the greatest in spring and early summer with high flow levels, it is proposed that the project begin in October 2011 to enable two full monitoring seasons with ensuing time to complete data analysis and product development. A July 2011 start and three-year project duration would make it difficult to obtain two years of data with enough time to complete the project.

C. Long-Term Strategy and Future Funding Needs

The project is a component of the long-term water quality monitoring strategy for Minnesota. Project results will enable bedload sediment to be included in the calculation of total sediment loads in Minnesota’s rivers. The project will complement previous and on-going projects in developing a better understanding of sediment sources and transport as it impacts aquatic life, recreation, and commerce. The cost of continued bedload monitoring will be much lower following development of the new monitoring techniques for Minnesota through this project. On-going monitoring would need to be incorporated into regular agency monitoring budgets.

2011-2012 Detailed Project Budget

IV. TOTAL TRUST FUND REQUEST BUDGET 3 years

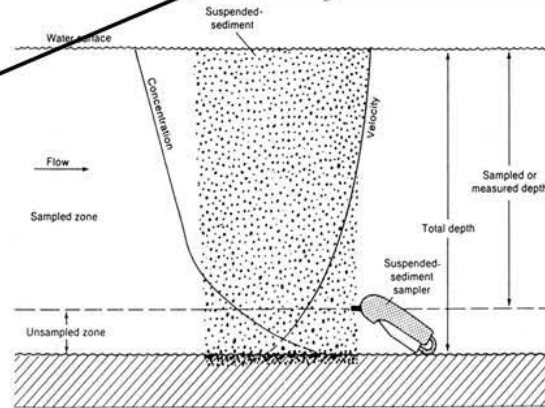
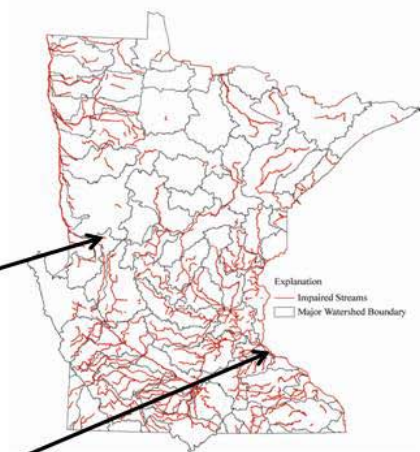
<u>BUDGET ITEM</u>	<u>AMOUNT</u>
Personnel:	\$ -
Contracts: All work on this project will be completed through a contract with the United States Geological Survey (USGS). The contract will provide for USGS staff to complete the project (USGS Hydrologist, GS-11, 1 FTE, 3 years 30% benefits; USGS Hydrologic Technicians, GS-11, 1 FTE, 3 years, 30% benefits; \$320,000); rental of specialized sediment sampling and sensor equipment for monitoring (\$50,000); mileage, lodging and per diem for 2 people for reconnaissance, sampling, and geomorphic survey trips (\$40,000); and laboratory analysis of sediment samples (\$40,000).	\$ 450,000
Equipment/Tools/Supplies:	\$ -
Acquisition (Fee Title or Permanent Easements):	\$ -
Travel:	\$ -
Additional Budget Items:	\$ -
TOTAL ENVIRONMENT & NATURAL RESOURCES TRUST FUND \$ REQUEST	\$ 450,000

V. OTHER FUNDS

<u>SOURCE OF FUNDS</u>	<u>AMOUNT</u>	<u>Status</u>
Other Non-State \$ Being Applied to Project During Project Period: USGS funds will be provided as federal match to the project to cover USGS specialist support staff and bureau and facilities costs (40% of the total state plus federal cost for the project of \$750,000).	\$ 300,000	
Other State \$ Being Applied to Project During Project Period:	\$ -	
In-kind Services During Project Period:	\$ -	
Remaining \$ from Current ENRTF Appropriation (if applicable):	\$ -	
Funding History:	\$ -	

Impacts of Bed Load

- 285 river and stream reaches impaired by turbidity EPA 303(d)
- Streambed sediment has adverse impact on fish and biota



PROJECT MANAGER QUALIFICATIONS AND ORGANIZATION DESCRIPTION

Gregory Johnson is a Senior Hydrologist with the Minnesota Pollution Control Agency (MPCA). He has provided technical assistance to MPCA staff and local watershed projects for water quality monitoring, data analysis, watershed science, and nonpoint source pollution control. In recent years, he has been the lead staff responsible for developing and coordinating the protocol for completing turbidity TMDLs. This has led to work with the USGS in monitoring and evaluating different measures of sediment in streams and rivers and their application in understanding sediment effects on aquatic life. He has also worked with University of Minnesota faculty on various research projects involving watershed management and impaired waters.

Christopher Ellison is Hydrologist with the Minnesota U.S. Geological Survey (USGS) Water Science Center. He has a Ph. D. in Rangeland Ecology and Watershed Management from the University of Wyoming. He serves as USGS' project chief related to sediment studies. In this capacity, he provides project oversight, technical assistance, and data analysis and reporting in support of sediment projects for the MPCA, Corps of Engineers, Lower Minnesota WD, Rice Creek WD, and the Wild Rice WD. These projects vary in scope and relate fluvial sediment to aquatic habitat, TMDL studies, stream restoration, geomorphology, sediment budgets, and flood retention and diversion. He also is responsible for research and implementation of new technologies to improve understanding of sediment sources, fate, and transport mechanisms.

The **MPCA** and its partner organizations conduct a variety of surface and ground water monitoring activities to provide information about the status of the water resources, potential and actual threats, options for addressing the threats and data on how effective management actions have been. Overall, the MPCA and its partners strive to provide information to assess – and ultimately to restore or protect – the integrity of Minnesota's waters.

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