Environment and Natural Resources Trust Fund
2009 Phase 2 Request for Proposals (RFP)

LCCMR ID: 024-A1

Project Title: Targeting Agricultural Management Practices to Improve Water Quality

Total Project Budget: $ $79,313

Proposed Project Time Period for the Funding Requested: 1 yr: July 09 - April 10

Other Non-State Funds: $ $0.00

Priority: A1. Critical Lands Analysis

First Name: Jeffrey **Last Name:** Maxted

Sponsoring Organization: The Cadmus Group, Inc.

Address: 453 Hilton Dr
Madison WI 53711

Telephone Number: 608-213-8711

Email: jeff.maxted@cadmusgroup.com

Fax: 617-673-7001

Web Address: http://www.cadmusgroup.com

Region:	County Name:	City / Township:
Central, Metro, SW, SE	Big Stone, Blue Earth, Brown, Carver, Chippewa, Co	

Summary: We will identify agricultural areas in the Minnesota River basin with high environmental improvement potential. Results include a list of priority areas and cost-effective strategies for achieving water quality targets.

Main Proposal: 1008-2-020-proposal-LCCMR_Cadmus_AgRunoff_MinnesotaRiver.pdf

Project Budget: 1008-2-020-budget-LCCMR_Cadmus_Budget.pdf

Qualifications: 1008-2-020-qualifications-LCCMR_Cadmus_OrgDescription.pdf

Map: 1008-2-020-maps-LCCMR_ProposalMap.pdf

Letter of Resolution:

MAIN PROPOSAL

PROJECT TITLE: Targeting agricultural management practices to improve water quality

I. PROJECT STATEMENT

Agricultural runoff is a leading cause of water pollution in Minnesota. Sediment and phosphorus are transported from cropland and deposited in downstream lakes, contributing to negative effects on aquatic recreation and decreases in water clarity. At local scales, agricultural best management practices (BMPs) have been shown to be effective at reducing nutrient and sediment inputs to surface waters. However, these effects have rarely been found to act in concert to produce measurable, broad-scale improvements in water quality.

According to a Minnesota Pollution Control Agency (MPCA) analysis prepared for the Lake Pepin Total Maximum Daily Load (TMDL), the loads of Total Suspended Solids (TSS) and Total Phosphorus (TP) will need to be reduced by approximately 50% in the Minnesota River basin to meet water quality goals in Lake Pepin (*see map*). Since agricultural activities account for 92% of the land use in the basin, it will be necessary to develop a strategy for cost-effective implementation of agricultural BMPs in order to make measurable and meaningful progress towards these water quality goals.

The primary goal of this project is to identify areas in the Minnesota River basin with a high potential for agricultural pollution reduction. After identifying these areas, we will identify an optimal suite of BMPs designed to maximize the amount of environmental improvement per dollar spent. In combination, these analyses will result in a prioritized list of areas with high improvement potential, and a cost-effective strategy for meeting water quality targets.

To accomplish these goals, we propose to use available water quality monitoring data and land use information to estimate current TSS and TP loading from small watersheds within the Minnesota River basin. We will then estimate the reduction potential in each of these watersheds by determining the fraction of these pollutants that could be addressed through the implementation of agricultural BMPs, including enrollment of critical lands in the Conservation Reserve Program. Finally, we will utilize an optimization modeling framework in 5 demonstration watersheds to determine combinations of BMPs that would be sufficient to reduce TSS and TP loading to target levels established in the Lake Pepin TMDL. This optimization analysis will include localized cost estimates for BMP implementation to determine the most cost-effective solution for each of the demonstration watersheds. The final report will include complete documentation of these efforts, a prioritized list of watersheds and their pollution reduction potential, and recommendations that will assist state and local groups optimize their BMP targeting efforts.

Our project team has successfully conducted similar analyses of landscape-scale phosphorus reduction potential in Wisconsin and has conducted optimization analyses for the Green Bay TMDL. In addition to utilizing this experience, we will work closely with a network of stakeholders (*see III.A below*). Input from these stakeholders is vital to the development of actionable recommendations.

A central resource management challenge is to ‘‘scale up’’ to yield watershed-level environmental benefits. Targeting and aggregation of conservation efforts are increasingly recognized as important methods for producing these broader benefits. Our efforts to identify areas of high improvement potential and to explore optimal BMP configurations will provide a framework for addressing one of Minnesota’s most persistent environmental challenges.

II. DESCRIPTION OF PROJECT RESULTS

Result 1: Assessment of sediment and nutrient reduction potential	**Budget:**
Deliverable	**Completion Date**
1. Predicted TSS and TP loads from all small (20-100 sq km) watersheds within the Minnesota River watershed.	9/30/2009

2. Estimates for each watershed of the proportions of pollutant loads that can be reduced with commonly used BMPs.	10/31/2009
3. Map of Minnesota River watersheds ranked according to pollution reduction potential.	10/31/2009

Result 2: Watershed-level optimization analysis	**Budget:**
Deliverable	**Completion Date**
1. BMP implementation scenarios that reflect a range of landowner preferences and would be sufficient to reduce TSS and TP loading to target levels established in the Lake Pepin TMDL.	11/30/2009
2. Cost analyses of implementation scenarios to determine optimal implementation scenarios for sub-watersheds.	1/31/2010

Result 3: Final report	**Budget:**
Deliverable	**Completion Date**
1. Complete documentation of project methods, all derived datasets, recommendations for management actions.	3/31/2010
2. Consultation with stakeholders regarding the use of project outcomes for decision making.	4/30/2010

III. PROJECT STRATEGY AND TIMELINE

A. Project Partners

We will work closely with the United States Geological Survey, the Minnesota Pollution Control Agency, the Minnesota River Basin Data Center (Minnesota State University – Mankato), and county Soil & Water Conservation Districts to accomplish these results. Each of these partners will be a source of input data and will assist in the review of implementation recommendations.

B. Project Impact

This project will provide a strategy for reducing pollution in a major Minnesota watershed that drains nearly 20% of the state. Reductions in sediment and phosphorus loads in the Minnesota River are critical to improving water quality and aquatic recreation opportunities in Lake Pepin. The implementation strategies that result from this project will ensure that efforts to install BMPs are targeted to areas with the greatest potential for improvement and are implemented in a cost-effective manner.

C. Time

Funding for this project will be used to compensate staff and for travel to Minneapolis for meetings with project partners. The final report, including the prioritized list of watersheds within the Minnesota River Basin, will be completed in time for recommendations to be implemented during the first growing season after funding announcements are made (2010).

D. Long-Term Strategy (if applicable)

This project will contribute to multiple long-term conservation goals in the Minnesota State Conservation Plan, including those that have a critical impact on water quality. Although improving water quality will require long-term efforts, existing incentive programs (the federal Conservation Reserve Program, for example) may be used to provide ongoing financial support. In addition, the intent of this project is to provide a strategy that will improve the efficiency of investments in BMP implementation, so that greater environmental improvements will result from current levels of investment.

Project Budget

IV. TOTAL PROJECT REQUEST BUDGET

BUDGET ITEM	AMOUNT	% FTE
Personnel:		
Jeff Maxted, Project Manager & Technical Lead	$ 23,513	14%
Matt Diebel, GIS Watershed Modeler	$ 27,431	17%
Sam Ratick, Optimization Modeler	$ 13,300	7%
Laura Blake, Senior Technical Review	$ 2,993	1%
Tom Mulcahy, Scientist	$ 5,510	4%
Tricia Arnold, Accounting Manager	$ 2,090	1%
Other:	$ -	
Project Travel - 3 meetings at MPCA	$ 4,476	
TOTAL PROJECT BUDGET REQUEST TO LCCMR*	**$ 79,313**	

V. OTHER FUNDS

SOURCE OF FUNDS	AMOUNT	Status
Remaining $ From Previous Trust Fund Appropriation (if applicable):	$ -	*NA*
Other Non-State $ Being Leveraged During Project Period:	$ -	*NA*
Other State $ Being Spent During Project Period:	$ -	*NA*
In-kind Services During Project Period:	$ 11,322	*5% discount**
Past Spending:	$ -	*NA*

*** The total project budget requested ($79,313) is inclusive of the in-kind services discount**

PROJECT MANAGER QUALIFICATIONS

Mr. Jeffrey Maxted (Project Lead), is an experienced researcher in landscape-scale effects of agricultural activities. Most recently, Mr. Maxted was the principal GIS analyst and data manager for the Wisconsin Buffer Initiative, an effort that developed a new approach to managing agricultural non-point source pollution. Along with a wide range of stakeholders, he compiled data from state and federal agencies and produced assessments of restoration potential for 1600 Wisconsin watersheds. Mr. Maxted has worked with local, state, and federal agencies on environmental issues and specializes in ecosystem responses to changes in the management of land and water resources. He has also been the lead spatial data analyst for the Long Term Ecological Research program at the University of Wisconsin, which has used 30 years of limnological data to detect the effects of changes in climate, land use, and local biodiversity.

Dr. Samuel Ratick is a national expert in the use of operations research tools to solve optimization problems. Dr. Ratick has close to 30 years of experience in the development and use of analytical methods and mathematical models for environmental assessment and management. He has published numerous articles and book chapters on the use of optimization methodologies for decision making. Dr. Ratick has provided consulting services to EPA, U.S. Army Corps of Engineers, Los Alamos National Laboratories, and others.

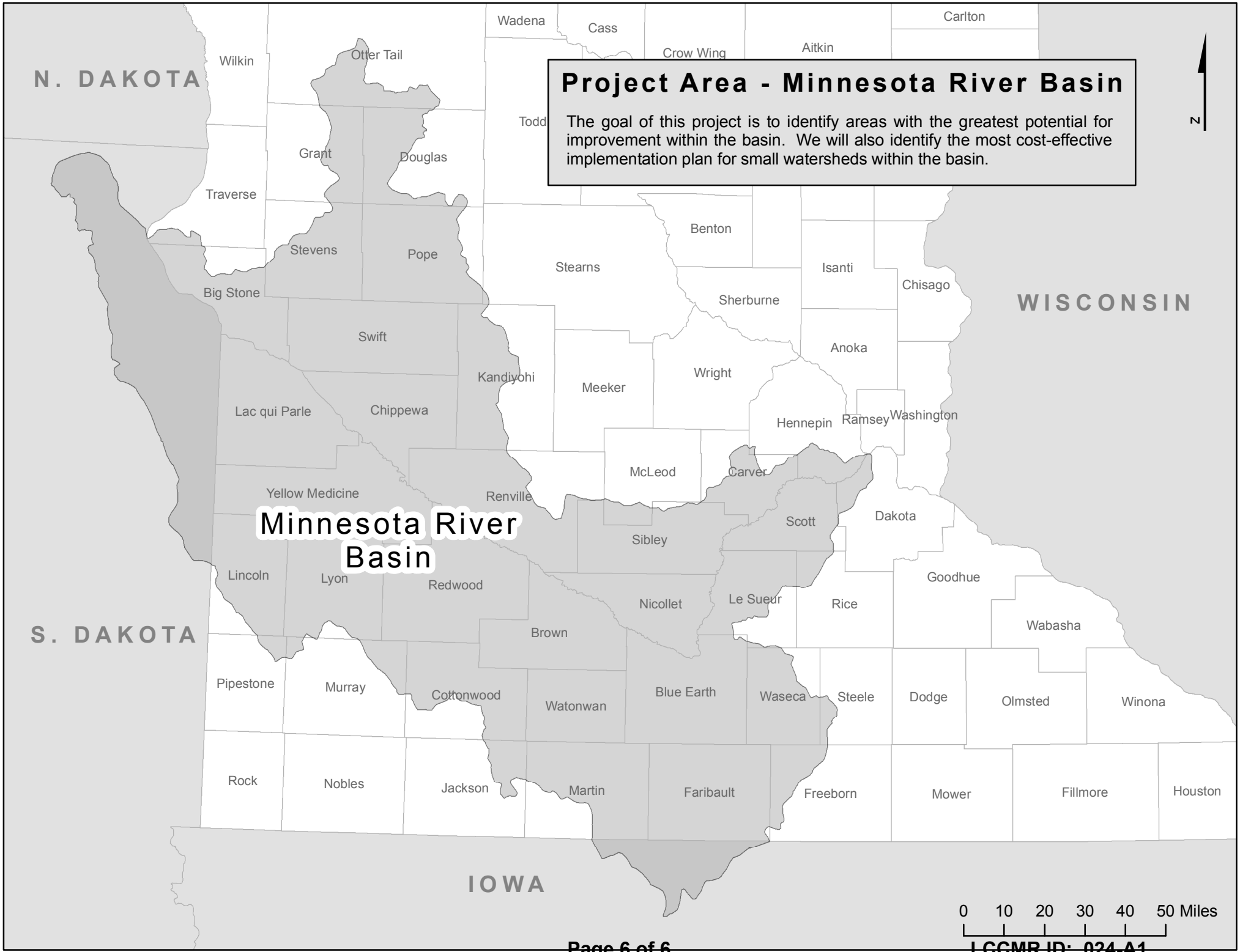
Dr. Matthew Diebel earned a PhD in Limnology from the University of Wisconsin-Madison. His dissertation work developed innovative methods for prioritizing conservation efforts in agricultural landscapes. In Dr. Diebel's seven years of experience in water resources research and management, he has acquired expertise in aquatic and landscape ecology, hydrology, ecological modeling, and stable isotope chemistry.

Ms. Laura Blake brings significant knowledge and expertise with the TMDL program, from both a regulatory and technical perspective. At Cadmus, Ms. Blake currently oversees and works on the development of TMDLs on behalf of EPA and the states, where her responsibilities include data analysis, water quality modeling, report preparation, and public meeting support. Ms. Blake's state water program knowledge and experience is not exclusive to the TMDL Program. Ms. Blake has a comprehensive understanding of the Clean Water Act (CWA) and the various programs established to implement the CWA, including water quality standards, nonpoint source, monitoring, and permitting (including stormwater).

ORGANIZATIONAL DESCRIPTION

The Cadmus Group was founded in 1983 (as a commercial for-profit firm) with a single mission: Gather the best minds across a variety of disciplines to help address the nation's most pressing environmental challenges. Our talented staff of consultants—scientists; engineers; statisticians; economists; marketing, public relations, and communications professionals; information technology specialists; public policy analysts and others—provides an array of research and analytical services primarily to the EPA and state environmental agencies. Many of our senior consultants are nationally recognized experts in their fields and several serve on high-level U.S. government science advisory boards.

Cadmus provides a significant amount of technical support to the Midwest states. For example, Cadmus is currently developing a TMDL and Watershed Management Plan for the Lower Fox River and Green Bay Watershed (in Wisconsin), which is impaired by sediment and phosphorus. As part of the watershed management planning, Cadmus has developed a BMP optimization tool that evaluates options for reducing sediment and phosphorus in the basin. Taking into account BMP costs and pollutant reduction effectiveness, the optimization tool has been used to identify cost-effective methods for meeting the sediment and phosphorus reduction goals in the basin.



LCCMR ID: 024-A1