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

LCCMR ID: 046-B1

Project Title: Quantifying Soil and Water Quality Benefits of CRP

Total Project Budget: $ $312,433

Proposed Project Time Period for the Funding Requested: 3 years from July 2009 to June 2012

Other Non-State Funds: $ $0.00

Priority: B1. Reduce Soil Erosion

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Region:	County Name:	City / Township:
SW	Lincoln	

Summary: This project will quantify soil and water quality benefits of CRP at multiple scales and provide guidance to resource managers on the considerations and implications of CRP conversion to cropland.

Main Proposal: 1008-2-001-proposal-2009_main_proposal_ABirr_SW_CRP_Final.doc

Project Budget: 1008-2-001-budget-RFP_2009_Project Budget ABirr SW CRP Final2.xls

Qualifications: 1008-2-001-qualifications-2009_project_manager_description_ABirr_SW_CRP_Fin

Map:

Letter of Resolution:

MAIN PROPOSAL

PROJECT TITLE: Quantifying Soil and Water Quality Benefits of CRP

I. PROJECT STATEMENT

Many parcels in Minnesota currently enrolled in the USDA's Conservation Reserve Program (CRP) are reaching the contract expiration dates. For instance in the Yellow Medicine Watershed located in Southwest Minnesota, approximately 7% of the land cover is currently enrolled in the CRP and 57% of this land will reach contract expiration by fall of 2012. The Yellow Medicine River is currently impaired for both turbidity and fecal coliform bacteria. Lake Shaokatan, one of 24 sentinel lakes in Minnesota currently impaired for excess nutrients, is also located within the watershed boundary. Data quantifying the soil and water conservation benefits of CRP is very limited in Minnesota and in the Midwest as a whole. Consequently, the Lincoln County Water Plan has identified conversion of CRP back to cropland evaluation as a priority. The implications of converting CRP land back to cropland on soil and water resources within the region are not well understood.

This project will use a multi-scale approach to evaluate the soil and water quality benefits of CRP land in the Yellow Medicine Watershed. Three small watersheds/field sites (<500 acres) comprised primarily of CRP will be identified in conjunction with the Yellow Medicine Watershed District. Automated water monitoring stations will be established at the outlet of each of these sites and analyzed for nutrients, bacteria and sediment related to current water quality impairments in Minnesota. Nutrient, sediment, and bacteria loads will be measured and impacts to peak flows will be evaluated. In addition, soil samples will be collected and analyzed for various properties related to agricultural productivity and to water quality. Two larger subwatersheds comprised of different proportions of CRP land will also be monitored to evaluate the effects of CRP at a larger scale and to track changes in nutrient, sediment, and bacteria loads and peak flows over time as CRP contracts expire.

II. DESCRIPTION OF PROJECT RESULTS

Result 1: Evaluation of soil and water quality benefits of the CRP at the field/small watershed scale. **Budget: $**175,180

Automated water sampling equipment will be established at the outlet of sites with drainage areas less than 500 acres comprised primarily of CRP land. Discrete samples will be collected from storm events to characterize nutrient, sediment, and bacteria loads and hydrology. Soil samples will be collected at each site to characterize agricultural productivity potential, water quality, and hydrology.

Deliverable	Completion Date
1. Water quality and quantity characterization of streams/rivers/ditches flowing through CRP lands.	06/2012
2. Quantification of natural background contributions from soil and CRP vegetation to current water quality impairments related to turbidity, excess nutrients, and bacteria.	06/2012
3. Development of management guidelines for CRP lands converted to cropland to minimize impacts on soil and water resources while maintaining agricultural productivity.	06/2012

Result 2: Evaluate water quality benefits of the CRP at the subwatershed scale.

Budget: $137,253

Automated water sampling equipment will be installed in two subwatersheds that encompass the 3 small watershed/field sites. The two subwatersheds will cover less than 25,000 acres and be located in close geographic proximity to minimize differences in topography, soil types, agricultural management practices, and precipitation. The two subwatersheds will significantly differ (>10%) in land enrolled in the CRP. This design will enable storm event and annual comparisons of flow and nutrient, sediment, and bacteria loads between the watersheds to identify differences that can be attributed to CRP enrollment while minimizing confounding factors.

Deliverable	Completion Date
1. Comparison of flow, nutrient, sediment, and bacteria loads between watersheds characterized by differences in CRP acreage.	06/2012

III. PROJECT STRATEGY AND TIMELINE

A. Project Partners

Researchers from the University of Minnesota Southwest Research and Outreach will take the lead on data collection and analysis. The researchers will also be responsible for a majority of the laboratory analysis of water and soil samples.

The Yellow Medicine Watershed District will assist with identifying candidate sites and facilitating landowner participation in the project. Representatives will also assist with data collection.

The Minnesota Department of Agriculture will be responsible for project management and administration. The MDA will also assist with monitoring planning and installation of equipment. Representatives will also provide support for data analysis and presentation of results to various stakeholders.

B. Project Impact

This project will provide information about the relative benefits of CRP on soil and water resources in Southwest Minnesota and other regions of the state with differing physiographic characteristics. Findings can also be used to describe the impact of retiring CRP contracts on soil and water resources in Southwest Minnesota. Furthermore, this project will provide for the development of much needed agricultural management practice guidance for producers converting CRP to cropland.

C. Time

This project will require three years of study to ensure that an adequate number of storm events are sampled to characterize the soil and water quality benefits of CRP land. The funds requested accurately reflect the challenge associated with quantifying the soil and water properties of CRP at a landscape scale.

D. Long-Term Strategy

The long-term goal of this project is to implement different management strategies in the small watershed/field sites. The three management approaches include: 1) maintaining one site in continuous CRP; 2) converting one entire site from CRP into crop production; and 3) using a targeted management approach where vulnerable portions of the site will be managed as CRP while converting the balance of the area into crop production. The data collected as part of this proposal could serve as baseline data to allow for a rigorous statistical analysis of the treatment affects on soil and water quality. Additional long-term water monitoring data (>5 years) collected at the subwatershed scale could be used to track changes in soil and water quality over time as CRP contracts expire. Additional funding sources would need to be identified to implement this long-term strategy at both the small watershed/field and subwatershed scales.

Three Year Project Budget

IV. TOTAL PROJECT REQUEST BUDGET

BUDGET ITEM	AMOUNT	% FTE
Personnel: University of Minnesota Graduate Student for 2 years (M.S.)	$ 75,068	50%
University of Minnesota Field Technician for 3 years (unclassified/project supported)	$ 38,157	20%
Contracts: Land owners for cooperation and access to property for soil and water sampling for 3 years	$ 15,000	
Equipment/Tools: Monitoring equipment for 3 field/small watershed sites (samplers, dataloggers, probes)	$ 37,359	
Monitoring equipment for 2 subwatershed sites (samplers, dataloggers, probes, shelters)	$ 46,031	
Laboratory analysis of water samples using the University of Minnesota analytical services (630 samples)	$ 68,243	
Laboratory analysis of soil samples using the University of Minnesota analytical services (200 samples)	$ 17,950	
Acquisition (Including Easements): NA	$ -	
Restoration: NA	$ -	
Other: Travel for 3 years (7200 miles/year @ $0.585/mile)	$ 14,625	
	$ -	
TOTAL PROJECT BUDGET REQUEST TO LCCMR (3 years)	$ 312,433	

V. OTHER FUNDS

SOURCE OF FUNDS	AMOUNT	Status
Remaining $ From Previous Trust Fund Appropriation (if applicable): NA	$ -	*Unspent or Not Legally Obligated*
Other Non-State $ Being Leveraged During Project Period: NA	$ -	*Secured or Pending*
Other State $ Being Spent During Project Period: NA	$ -	*Secured or Pending*
In-kind Services During Project Period: Minnesota Department of Agriculture for project management and assistance with monitoring installation, planning, and data analysis.	$ 30,000	
Past Spending: NA	$ -	

Project Manager Qualifications
Adam Birr
Research Scientist
Impaired Waters Technical Coordinator
Minnesota Department of Agriculture

Education

Ph.D. (October 2005)
University of Minnesota, Saint Paul, MN
Thesis Title: Paired watershed studies for nutrient reductions in the Minnesota River Basin
- Major: Water Resources Science

M.S. (January 2001)
University of Minnesota, Saint Paul, MN
Thesis Title: Evaluation of regional water quality trends in Minnesota using indexing and land classification approaches
- Major: Water Resources Science

B.S. (December 1997)
Calvin College, Grand Rapids, MI
- Major: Environmental Science with a biology emphasis

Experience

- Coordinate research projects on impaired waters in agricultural landscapes in conjunction with various research entities
- Manage research projects funded by Minnesota's Clean Water Legacy Act in excess of $1 million
- Research interests focus on evaluating landscape-scale non-point source pollution of surface waters using a combination of field methods and GIS technologies.

Skills

- Water Resources Science: Stream monitoring using ISCO automated samplers, assorted Campbell Scientific equipment, and Forest Technology Systems monitoring equipment and software; GIS and allied technologies; quantitative watershed-scale analysis; research design, implementation and analysis; data interpretation and presentation; education and outreach to producers, academic community, grade schools, and general public

Selected Publications

Mulla, D.J., A.S. Birr, Kitchen, N.R., and M.B. David. 2008. Limitations of evaluating the effectiveness of agricultural management practices at reducing nutrient losses to surface waters. p. 189-212. *In* Final Report: Gulf hypoxia and local water quality concerns workshop. ASABE, St. Joseph, MI.

Birr, A.S. and D.J. Mulla. 2002. Relationship between lake and ground water quality patterns and Minnesota agroecoregions. Hydrological Sci. Tech. 18(1-4):31-41.

Birr, A.S. and D.J. Mulla. 2001. Evaluation of phosphorus site index in watersheds at the regional scale. J. Environ. Quality. 30:2018-2025.

Minnesota Department of Agriculture Mission

Enhance Minnesotans' quality of life by ensuring the integrity of our food supply, the health of our environment, and the strength of our agricultural economy.