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

LCCMR ID: 039-B

Project Title: Nitrate Removal Capacity of Minnesota's Groundwater-Fed Wetlands

Category: B. Water Resources

Total Project Budget: $ $902,428

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

Other Non-State Funds: $ 108,134

Summary:

This regional project will generate detailed location maps and characterize nitrate removal capacity of Southeast Minnesota's Groundwater-Fed Wetlands; providing tools needed to better focus water management resources.

Name: Linda Dahl

Sponsoring Organization: Southeast Minnesota Water Resources Board

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Location

Region: SE

Ecological Section: Paleozoic Plateau (222L)

County Name: Fillmore, Goodhue, Houston, Olmsted, Wabasha, Winona

City / Township:

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

2011-2012 MAIN PROPOSAL

PROJECT TITLE: Nitrate Removal Capacity of Minnesota's Groundwater-Fed Wetlands

I. PROJECT STATEMENT

In southeastern Minnesota, virtually all drinking water supplies are from groundwater sources. Human consumption of nitrate contaminated drinking water has known acute and chronic health impacts. Groundwater also provides a significant contribution to the base flow of many surface water bodies; this is especially true in the karst areas of southeastern Minnesota where groundwater provides the base flow for cold water streams. This regional project will give counties of southeastern Minnesota a better understanding of the location of groundwater-fed wetlands on the landscape, the role of those wetlands in nitrate removal, and tools water resource managers need to focus their water management resources.

Groundwater-fed wetlands have important functions and values in SE MN; **Remove nitrates from waters** supplying streams and aquifers, **Support critical habitats**, and **Shelter** many threatened and endangered plant species. Their location within the hill-slope positions of the Decorah and St. Lawrence bedrock units enables them to receive and remove excess nitrates from upper aquifer groundwater before recharging lower aquifers or draining to surface streams. This is a critical function in areas where water quality is increasingly degraded by the application nitrogen fertilizers. Unlike prairie-pothole wetlands, groundwater-fed wetlands are undervalued due to their small size and to lack of understanding of their functions. The Wetland Conservation Act (WCA) does not adequately protect these wetlands because (1) it does not prevent adjacent destructive hydrologic changes; (2) the *de minimus* threshold is larger than some sites; and (3) it does not insure mitigation in the same geologic setting.

To address the needs stated above, the project team will take the following steps in six SE Minnesota counties (Fillmore, Goodhue, Houston, Olmsted, Wabasha, and Winona); **Create a mapped inventory** of their locations using 2009 LIDAR data, **Assess their nitrate removal capacity** by collecting water and soil samples in differing geologic settings and **Provide tools to local protection partners** by sharing inventory and assessment data. The major impact of this project will be to remove barriers that inhibit protection of these wetlands. These barriers include insufficient site location data and inadequate understanding of their functions and importance. Utilizing LIDAR data for wetland mapping, creating a regional model to predict nitrate removal, and investigating wetland recharge sites in the St. Lawrence edge setting are all new, replicable techniques that will be used to remove barriers to wetland and aquifer protection in the karst area of SE MN.

II. DESCRIPTION OF PROJECT ACTIVITIES

Activity 1: Mapping Groundwater-Fed Wetlands **Budget: $ 430,156**

St. Mary's University and an environmental consultant will inventory, assess, and map these wetlands in the Decorah and St. Lawrence edge settings in the six SE MN counties. Support data sets, including, but not limited to: LIDAR imagery, soil surveys, and geologic atlas data. Field-verification of 90 wetlands will be completed to define reference wetlands in support of analysis, mapping, and modeling. Completed map products include a complete update of the National Wetland Inventory for these six counties.

Outcome	Completion Date
1. Detailed groundwater-fed wetland maps, resulting in a complete NWI update	*1st Quarter 2013*
2. Field verification for GIS data validation and wetland assessments.	*3rd Quarter 2013*

Activity 2: Regional Nitrate Removal Assessment **Budget: $ 430,072**

USGS scientists will work with Jeff Green, Minnesota Department of Natural Resources, to select sites, including wetlands in springsheds previously delineated in the LCCMR Innovative Trout Stream Springshed Mapping Study in Southeastern Minnesota. USGS scientists will analyze soil waters twice in 18-24 wetlands across the 6 counties to determine nitrate concentrations in the groundwater discharges and the level of nitrate removal. At 18 wetlands showing large nitrate removal, additional water and soil sampling and analyses will determine removal mechanisms, identify where nitrate is removed, and determine rates of removal at up-gradient and down-gradient sites. Collected data will be used to develop a model to predict nitrate removal capacity at other sites as part of the GIS process.

Outcome	Completion Date
1. Assessment of nitrate capacity in18- 24 wetlands.	*2nd Quarter 2012*
2. Detailed nitrate removal assessment in 18 wetlands.	*4th Quarter 2012*
3. Map-based model predicting wetland locations with high nitrate removal	*2nd Quarter 2013*

Activity 3: Project Management and Outreach **Budget: $ 42,200**

The SEMWRB Director, with the aid of a Winona State University student worker hired through this grant will maintain communication among project partners, ensure progress is made on schedule, complete regular progress reports, maintain financial program and records, complete a final project summary and fact sheet or brochure for distribution to LGU's, and report results to the Water Resources Advisory Committee and Water Resources Board. The information from this project will be valuable for Counties as they prepare their next Water, Wetland, or Comprehensive Plans.

Outcome	Completion Date
1. Information products: final project summary and brochure	*1std Quarter 2014*

III. PROJECT STRATEGY

A. Project Team/Partners

Linda Dahl (Director of the **SE MN Water Resources Board**) will manage the project, serve as the fiscal agent, oversee hiring of student worker, coordinate with County Water Planners, and assist with outreach. Barry Drazkowski (Director of **Geospatial Services at St. Mary's University**) will oversee GIS analyses and develop the prioritization framework. Perry Jones and William Richardson (**US Geological Survey** scientists) will obtain water and soil data and develop the nitrate removal predictive model. An **environmental consultant** will be hired to collect soil samples, assess wetlands, and assist with outreach.

B. Timeline Requirements

In Qtr. 1 2011, remote sensing data gathering starts, followed by GIS data analysis with field validation and production of inventory maps. By Qtr. 3 2011, select 18-24 sites for nitrate reconnaissance sampling in Qtr. 3 2011 and Qtr. 2 2012; then select 18 sites for additional sampling in Qtr. 2 and Qtr. 3 2012. Complete wetland boundary identifications and MnRAM assessments in Qtr. 3 2012. Beginning Qtr. 4 2012, complete predictive nitrate removal modeling and develop prioritization framework and infrastructure route assessment process. Create outreach materials, and report project results to the SEMWRB and Water Resources Advisory Committee by 1 Qtr. 2014. .

C. Long-Term Strategy and Future Funding Needs

Next steps: 1. create an internet-based, interactive planning and mapping tool easily accessed by landowners and land managers to assist with local decision-making. 2. Institutionalize the maintenance of this tool with an appropriate wetland management Agency (e.g., BWSR).

2011-2012 Detailed Project Budget

Nitrate Removal Capacity of Minnesota's Groundwater-Fed Wetlands

Sponsor: SE MN Water Resources Board

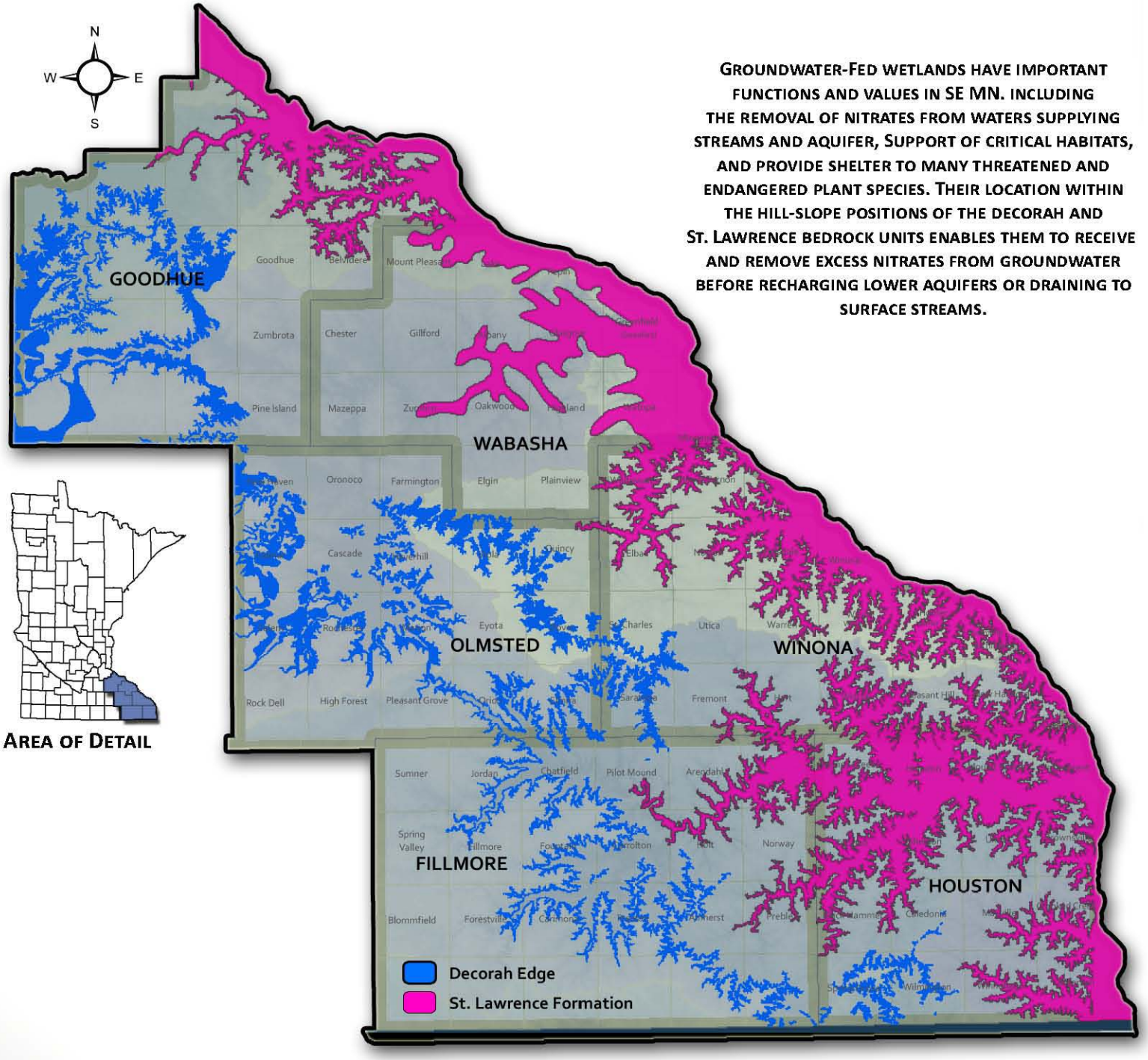
IV. TOTAL TRUST FUND REQUEST BUDGET *3* years

BUDGET ITEM	AMOUNT
Personnel:	
Activity 3: **Project Management** (SEMWRB) 10% FTE, (73% salary, 27% benefits, time period July 1, 2011-June 30, 2013, 1 person)	$ 23,100
Activiy 2: **Nitrate Removal Assessment:**	
Aquatic Ecologist (USGS) 3% FTE, (74 % salary, 26% benefits, time period July 1, 2011 - June 30 2014, 1 person)	$ 14,406
Biologist (USGS) 4% FTE, (74% salary, 26% benefits, time period July 1, 2011 - June 30 2013, 1 person)	$ 12,054
Hydrologist (USGS) 18% FTE, (74% salary, 26% benefits, time period July 1, 2011 - June 30 2014, 1 person)	$ 82,312
Hydrologic Technician (USGS) 18% FTE, (76% salary, 24% benefits, time period July 1, 2011 - June 30 2013, 1 person)	$ 37,942
Student (USGS) 75% FTE, (92% salary, 8% benefits, time period May 1, 2012 - August 31 2012, 1 person)	$ 14,930
Soil Scientist 11% FTE, (74% salary, 26% benefits, time period April 1, 2012 - November 30, 2012, 1 person)	$ 18,000
Environmental Technician 11% FTE, (74% salary, 26% benefits, time period April 1, 2012 - November 30, 2012, 1 person)	$ 8,000
Activity 1: **Mapping**	
SMU - Biologist/Photo Interpretation Specialist; 1.1 FTE, (74% salary, 26% benefits, period July 1, 2011 to July 1, 2013)	$ 140,000
SMU - QA/QC Technician; 0.2 FTE, (74% salary, 26% benefits, period July 1, 2011 to July 1, 2013)	$ 20,000
SMU - GIS Technician; 0.2 FTE, (74% salary, 26% benefits, period July 1, 2011 to July 1, 2013)	$ 24,000
SMU - Wetland Mapping Project Manager; 0.2 FTE (74% salary, 26% benefits, period July 1, 2011 to July 1, 2013)	$ 20,000
Soil Scientist 0.2 FTE, (74% salary, 26% benefits, period July 1, 2011 to July 1, 2013)	$ 38,580
Environmental Technician 0.2 FTE, (74% salary, 26% benefits, period July 1, 2011 to July 1, 2013)	$ 23,148
GIS Technician 0.2 FTE, (74% salary, 26% benefits, period July 1, 2011 to July 1, 2013)	$ 15,432
Activity 1: **Field Verification:**	
Soil Scientist 0.23 FTE, (74% salary, 26% benefits, period July 1, 2011 to July 1, 2013)	$ 85,096
Environmental Technician 0.16 FTE, (74% salary, 26% benefits, period July 1, 2011 to July 1, 2013)	$ 49,900
SMU - Biologist; 0.13 FTE (74% salary, 26% benefits, period July 1, 2011 to July 1, 2013)	$ 14,000
Contracts:	
Winona State University - Student Worker; project coordination and outreach (10 hrs / week for three years)	18000
Equipment/Tools/Supplies:	
Soil Sampling Equipment	$ 3,300
Water Sampling Equipment	$ 7,840
Travel:	
Activity 1: **Project management** (SEMWRB project manager and WSU student coordinator; 1200 miles over three years for site visits, quarterly meeting attendance and outreach)	$ 600
Activity 2 **Nitrate Removal Assessment:** USGS: Trips to collect water-quality samples	$ 27,017
Additional Budget Items:	
Brochure Printing	$ 500
Water Major Ion/Nitrate Analyses (USGS)	$ 79,380
Soil Nitrogen Removal Analyses (USGS)	$ 124,891
TOTAL ENVIRONMENT & NATURAL RESOURCES TRUST FUND $ REQUEST	**$ 902,428**

V. OTHER FUNDS

SOURCE OF FUNDS	AMOUNT	Status
Other Non-State $ Being Applied to Project During Project Period: USGS Cooperative Water Program Funding - Federal contribution used to cover federal overhead cost and some direct project costs	$ 108,134	*Secured*
In-kind Services During Project Period:		
SEMWRB; 1/3 of Project Manager's time (for grant management and student worker assistance).	$ 11,544	pending
Aquatic Ecologist (USGS) 5% FTE, (74 % salary, 26% benefits, time period July 1, 2011 - June 30 2014, 1 person) - time for data analysis and report writing	$ 28,812	secured
Winona State University; Office Space for Project Management	$ 12,000	pending
Remaining $ from Current ENRTF Appropriation (if applicable):	$ -	
Funding History:	$ -	

Nirtate Removal Capacity of Minnesota's Groundwater-Fed Wetlands



AREA OF DETAIL

GROUNDWATER-FED WETLANDS HAVE IMPORTANT FUNCTIONS AND VALUES IN SE MN. INCLUDING THE REMOVAL OF NITRATES FROM WATERS SUPPLYING STREAMS AND AQUIFER, SUPPORT OF CRITICAL HABITATS, AND PROVIDE SHELTER TO MANY THREATENED AND ENDANGERED PLANT SPECIES. THEIR LOCATION WITHIN THE HILL-SLOPE POSITIONS OF THE DECORAH AND ST. LAWRENCE BEDROCK UNITS ENABLES THEM TO RECEIVE AND REMOVE EXCESS NITRATES FROM GROUNDWATER BEFORE RECHARGING LOWER AQUIFERS OR DRAINING TO SURFACE STREAMS.

USGS science for a changing world

Saint Mary's University of Minnesota

SOUTHEAST MINNESOTA WATER RESOURCES BOARD

The project will be managed by the Director of the SE MN Water Resources Board (SEMWRB). The SEMWRB is a ten County Joint Powers Board with an Executive Director working in coordination with county water planning staff. The Board has over 20 years experience successfully managing complex, multi-county projects related to water quality improvement. The SEMWRB and project partners have a track record of administering large grants that contribute to water quality assessment and improvement in the region. The SEMWRB and its partners have developed, over a decade of working together, a unique system for coordinated delivery of public services on a regional scale for projects that are difficult to address on a smaller scale.

Since 1987, the SE MN Water Resources Board has been managing regional projects that provide shared expertise and that build local capacity. Two of the SEMWRB's recently funded grants are; Sustaining Progress Toward Reducing Runoff from Open Lot Feedlots, and Assistance for Unsewered Communities in the Lower Mississippi/Cedar River Basin, both EPA Section 319 funded. The SEMWRB has a successful track record of comleting grants according to the work plan, on schedule and within budget.

Linda Dahl, Executive Director of the SEMWRB, has a Bachelor's Degree in Biology from Winona State University. Prior to her work with the SEMWRB she was Project Coordinator for the Whitewater River Watershed Project for five years. Ms. Dahl has worked in the water quality field since 1994 in areas that included water resource management planning with landowners; administering grants for water quality assessment; managing implementation of Best Management Practices for water quality, and administering Joint Powers Board outreach and educaiton activities.