Environment and Natural Resources Trust Fund
2010 Request for Proposals (RFP)

LCCMR ID: 025-A3

Project Title:

Identify and Protect Southeastern Minnesotas Rare Groundwater-Fed Wetlands

LCCMR 2010 Funding Priority:

A. Water Resources

Total Project Budget: $ $479,992

Proposed Project Time Period for the Funding Requested: 2 years, 2010 - 2012

Other Non-State Funds: $ $73,771

Summary:

The project will inventory, assess nitrate reduction, and develop conservation tools to protect groundwater-fed wetlands. These wetlands support unique habitats and remove nitrates from waters supplying streams and aquifers.

Name: Phil Wheeler

Sponsoring Organization: Olmsted County

Address: 2122 Campus Drive SE

Rochester MN 55904

Telephone Number: (507) 328-7101

Email: wheeler.phil@co.olmsted.mn.us

Fax: (507) 328-7958

Web Address: http://www.co.olmsted.mn.us/departments/planning/index.asp

Location:

Region: SE

County Name: Fillmore, Olmsted, Winona

City / Township:

_____ Knowledge Base _____ Broad App. _____ Innovation

_____ Leverage _____ Outcomes

_____ Partnerships _____ Urgency _____ TOTAL

PROJECT TITLE: Identify and Protect Southeastern Minnesota's Rare Groundwater-Fed Wetlands

I. PROJECT STATEMENT

Rare, groundwater-fed wetlands have important functions and values in SE MN:

- **Remove nitrates from waters** supplying streams and aquifers,
- **Support critical habitats** (e.g., trout streams and calcareous fens), 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 over-fertilization. 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. These sites are especially susceptible to loss from land use pressures.

Taking the following steps in three SE Minnesota counties (Fillmore, Olmsted, and Winona) will protect these wetlands and sustain the quality of receiving streams and aquifers:

1. **Create a mapped inventory** of their locations using 2009 LIDAR data, in conjunction with existing GIS data sets and field verification.
2. **Assess their nitrate removal capacity** by completing nitrate analyses in differing geologic settings, identifying causes of nitrate reductions, and predicting areas with enhanced nitrate removal efficiency.
3. **Recruit local protection partners** by educating land managers and landowners and sharing inventory data, wetland benefits, model ordinance text, and assistance resources.

The major impact of this project will be to remove barriers that inhibit protection of these wetlands: insufficient site location data, inadequate understanding of their functions and importance, a lack of communication with the people best positioned to protect them, and a scarcity of effective planning tools. 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 achieve these goals so groundwater-fed wetland areas can be protected from loss and aquifers protected from contamination in the karst area of SE MN.

II. DESCRIPTION OF PROJECT RESULTS

Result 1: Mapping Groundwater-Fed Wetlands **Budget: $ 257,653**

St. Mary's University and an environmental consultant will inventory, assess, and map these wetlands in the Decorah and St. Lawrence edge settings in three SE MN counties (Olmsted, Winona, and Fillmore). Appropriate and available data sets will be integrated, including, but not limited to: the new LIDAR imagery (its high resolution and vertical precision is needed to detect small sites), soil surveys, and geologic atlas data. Field-verification of 45 wetlands will be completed to identify reference wetlands for analysis/mapping verification and to GPS wetland boundaries and complete MnRAM assessments. The completed map will serve as a National Wetland Inventory data layer update.

Deliverable	**Completion Date**
1. Web-based detailed groundwater-fed wetland maps for three SE MN counties.	*1st Qtr. 2012*
2. Field verification for GIS data validation and wetland assessments.	*3rd Qtr. 2012*

Result 2: Regional Nitrate Removal Assessment **Budget: $ 232,110**

USGS staff will analyze soil waters twice in 24-36 wetlands across the 3 counties to determine nitrate concentrations in the groundwater discharges and the level of nitrate removal. At 9 wetlands with evidence of high nitrate removal, additional water and soil sampling and analyses will be completed to distinguish removal mechanisms, identify where nitrate is removed, and determine rates of removal at up-gradient and down-gradient sites. Resultant data will be used to develop a model to predict nitrate removal capacity at other sites as part of the GIS process.

Deliverable	**Completion Date**
1. Assessment of nitrate removal capacity in 24-36 wetlands.	*2nd Qtr.2011*
2. Detailed nitrate removal assessment in 9 wetlands.	*4th Qtr. 2011*
3. Map-based model predicting wetland locations with high nitrate removal capacity.	*2nd Qtr. 2012*

Result 3: Land Manager and Landowner Outreach **Budget: $ 64,000**

Tools are needed that will assist land managers and land owners in protecting these wetlands. Olmsted County, the City of Rochester, and an environmental consulting firm will develop a framework for prioritizing wetlands for protection or rehabilitation; model ordinance text that is more protective of these wetlands than the WCA; an infrastructure route assessment process that protects hydrologic features well in advance of development; a wetland values brochure; vegetation management guidance; Best Management Practices that mitigate land use impacts; and conservation assistance options. The SE MN Water Resources Board will oversee information sharing via face-to-face workshops to promote the use of the information products and assist LGU's in the adoption of ordinances. This information will valuable for County's as they prepare their next Water, Wetland, or Comprehensive Plans.

Deliverable	**Completion Date**
1. Prioritization framework, ordinance text, & infrastructure route assessment process.	*3rd Qtr. 2011*
2. Information products: brochure, guidance, BMPs, and conservation assistance.	*3rd Qtr. 2011*
3. Three county workshops to explain project products and their applications.	*2nd Qtr 2012*

III. PROJECT STRATEGY

A. Project Team/Partners

Phil Wheeler (Director of the **Rochester-Olmsted Planning Dept.**) will manage the project, serve as the fiscal agent, develop the ordinance elements and infrastructure route assessment process, 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. Linda Dahl (Director of the **SE MN Water Resources Board**) will correlate groundwater nitrate data with wetland nitrate data, coordinate with County Water Planners, and assist with outreach. Barb Huberty (**Rochester Public Works Dept.** Environmental Coordinator) will develop the wetland values brochure and vegetative management templates, and assist with outreach. An **environmental consultant** will be hired to collect soil samples, assess wetlands, oversee the development of mitigation BMPs and an assistance list, and assist with outreach.

B. Timeline Requirements

In Qtr. 1 2010, remote sensing data gathering starts, followed by GIS data analysis with field validation and production of inventory maps. By Qtr. 3 2010, select 24-36 sites for nitrate reconnaissance sampling in Qtr. 3 2010 and Qtr. 2 2011; then select 9 sites for additional sampling in Qtr. 2 and Qtr. 3 2011. Complete wetland boundary identifications and MnRAM assessments in Qtr. 3 2011. Beginning Qtr. 4 2011, complete predictive nitrate removal modeling and develop prioritization framework and infrastructure route assessment process. By Qtr. 4 2011, create model ordinance text. By Qtr. 2 2012, create outreach materials, followed by training workshops to disseminate project results by the end of Qtr. 2 2012.

C. Long-Term Strategy

A desirable extension of this project would be the creation of an internet-based, interactive planning and mapping tool easily accessed by landowners and land managers to assist with individual and County-level decision-making. It would be best to institutionalize the maintenance of this tool with an appropriate wetland management Agency, such as the Board of Water and Soil Resources. Long-term product use will be at the discretion of the local landowners and land managers.

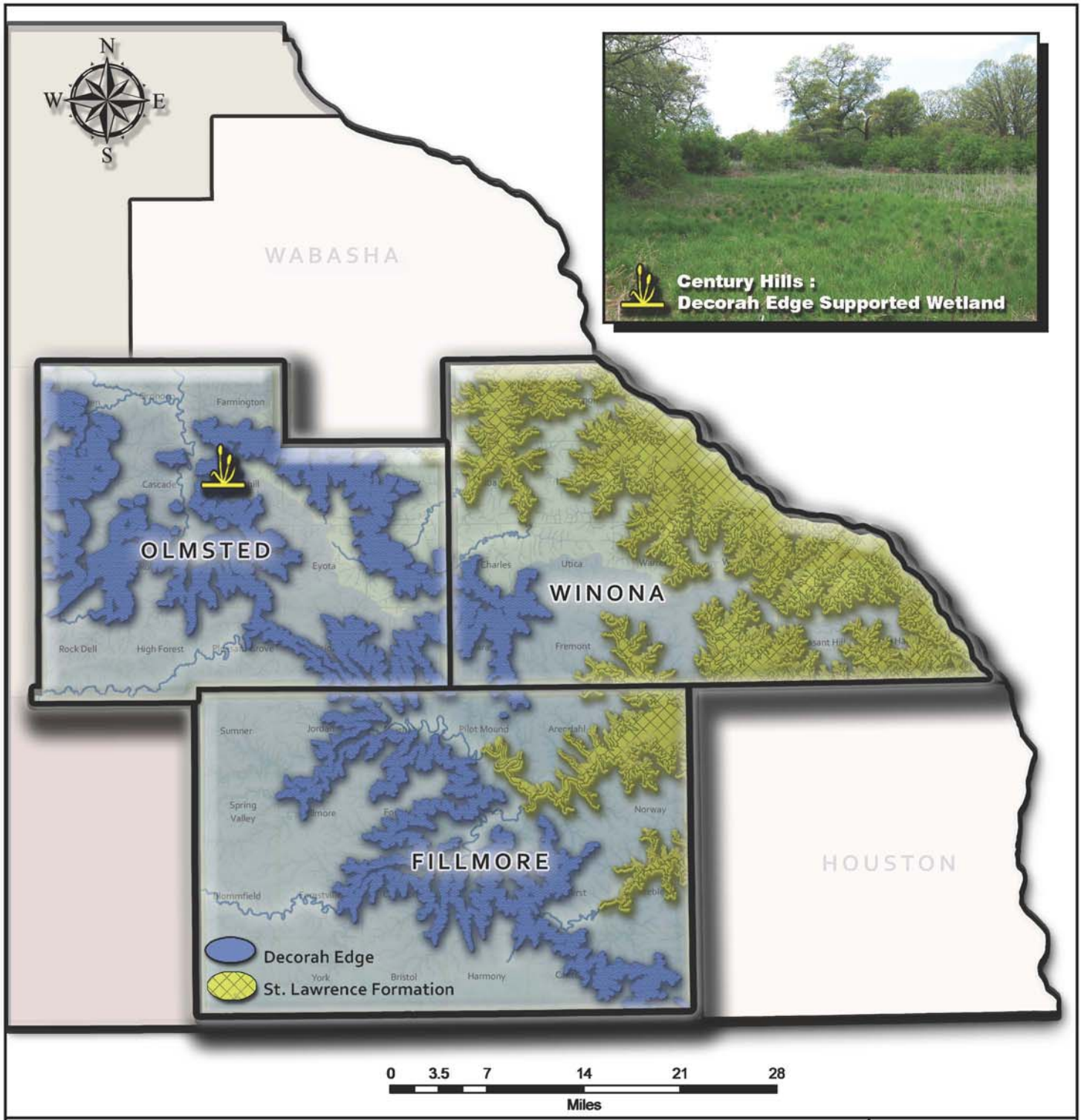
Project Budget

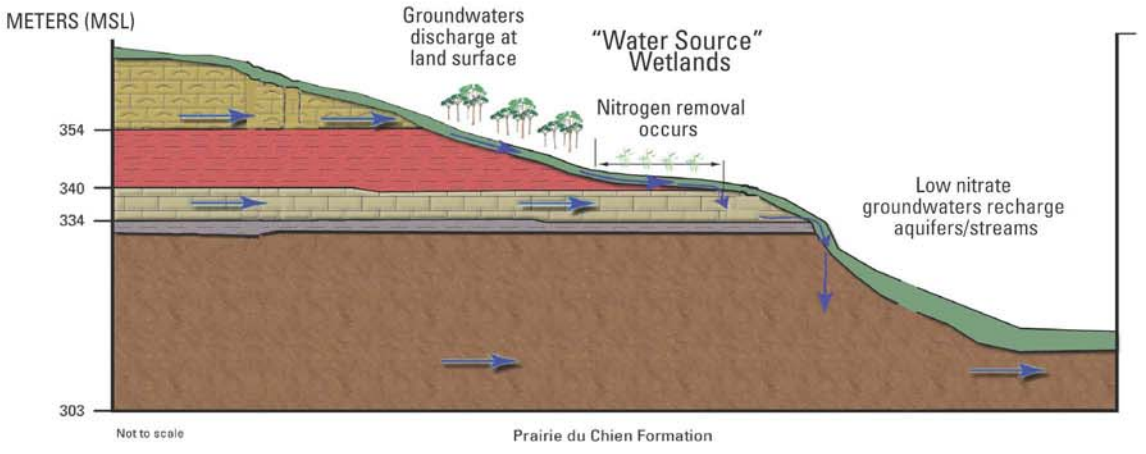
IV. TOTAL PROJECT REQUEST BUDGET

BUDGET ITEM	AMOUNT
Detailed Mapping:	
Biologist/PI (SMU)	$ 70,000
QA/QC Technician (SMU)	$ 10,000
GIS Technician (SMU)	$ 12,000
Project Manager (SMU)	$ 10,000
Planner (Olmsted)	$ 14,400
Soil Scientist	$ 19,290
Environmental Technician	$ 11,574
GIS Technician	$ 7,716
Field Verification:	
Soil Scientist	$ 42,548
Environmental Technician	$ 24,950
Biologist/PI (SMU)	$ 7,000
Planner (Olmsted)	$ 4,000
Nitrate Removal Assessment:	
Aquatic Ecologist (USGS)	$ 7,223
Biologist (USGS)	$ 12,087
Hydrologist (USGS)	$ 58,750
Hydrologic Technician (USGS)	$ 28,125
Student (USGS)	$ 2,906
Soil Scientist	$ 9,000
Environmental Technician	$ 4,000
Infrastructure Corridor Planning Model	
Planner (Olmsted)	$ 24,000
Education and Outreach; ordinance tools	
Rochester Public Works	$ 10,000
Planner (Olmsted)	$ 9,000
Soil Scientist	$ 9,000
GIS Developer (SMU)	$ -
Biologist/PI (SMU)	$ -
Public Workshops	$ 12,000
Equipment/Tools/Supplies:	$ -
Soil Sampling Equipment	$ 3,300
Water Sampling Equipment	$ 5,000
Travel:	$ 15,875
Additional Budget Items:	
Water Major Ion/Nitrate Analyses (USGS)	$ 26,532
Soil Nitrogen Removal Analyses (USGS)	$ 83,487
TOTAL PROJECT BUDGET REQUEST TO LCCMR	$ 553,763

V. OTHER FUNDS

SOURCE OF FUNDS	AMOUNT	Status
Other Non-State $ Being Applied to Project During Project Period:	$ 73,771	Secured


N
W
E
S
WABASHA
Century Hills :
Decorah Edge Supported Wetland
OLMSTED
WINONA
FILLMORE
HOUSTON
Farmington
Cascade
Eyota
Rock Dell
High Forest
Charles
Utica
Fremont
Sumner
Jordan
Pilot Mound
Spring Valley
Norway
Decorah Edge
St. Lawrence Formation
York
Bristol
Harmony
0 3.5 7 14 21 28
Miles


Groundwater Fed Wetland - General Cross Section
METERS (MSL)
Groundwaters discharge at land surface
"Water Source" Wetlands
Nitrogen removal occurs
Low nitrate groundwaters recharge aquifers/streams
354
340
334
303
Not to scale
Prairie du Chien Formation
General Direction of Groundwater Flow
Soil, Colluvium and Alluvium Deposits
Bedrock geology
Cummingsville Limestone/Shale
Decorah Shale
Platteville Limestone
Glenwood Shale
St. Peter Sandstone

Project Manager Qualifications and Organization Description

Rochester – Olmsted Planning Department – Rochester, MN

Philip H. Wheeler, AICP, project manager, has been Planning Director since 1990. Phil has a Master of Urban Planning degree from Michigan State University and has taught graduate courses in research and statistics, questionnaire design, sample design and statistical analysis as an adjunct professor in the Saint Mary's University masters level program in management. He served on the National Pooled Fund Study of GIS in Transportation and subsequent efforts. The Rochester Olmsted Council of Governments is the first MPO in the region to have implemented a "roadway network database" approach to transportation GIS.

Phil was heavily involved in developing the approaches and drafting the ordinance language leading to a successful effort to protect Decorah Edge features in Rochester and Olmsted County.

Contact information:

Phil Wheeler
Rochester-Olmsted Consolidated Planning Department
2122Campus Drive SE, Suite 100
Rochester, MN 55904
507-328-7100, fax 507-328-7958
Wheeler.phil@co.olmsted.mn.us
www.co.olmsted.mn.us/departments/planning/index.asp

The Rochester-Olmsted Planning Department (ROPD) is a joint city-county planning department of over 40 professional and support staff. The department is responsible for six program areas, including housing and community development; building, wells and septic system code enforcement; geographic information systems; development regulations, including flood plain and wetland control; transportation planning; and land use and environmental planning. Serving a community of over 139,000, ROPD has been a regional leader in GIS mapping and innovative administration of the area's unique wetland resources.