

**Environment and Natural Resources Trust Fund  
2012-2013 Request for Proposals (RFP)**

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**Project Title:**

**ENRTF ID: 032-B**

Phosphorus Balance on Livestock Farms in Focus Watersheds

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**Topic Area:** B. Forestry/Agriculture/Minerals

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**Total Project Budget:** \$ 184,420

**Proposed Project Time Period for the Funding Requested:** 3 yrs, July 2013 - June 2016

**Other Non-State Funds:** \$ 0

**Summary:**

This project will evaluate Phosphorus balance on livestock farms in the Root, Sauk and Middle Minnesota River watersheds and cropping and manure management to assess risk to water impairment.

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**Name:** James Paulson

**Sponsoring Organization:** U of MN

**Address:** 863 30th Avenue SE  
Rochester MN 55904

**Telephone Number:** (507) 251-4694

**Email:** jcp@umn.edu

**Web Address:** www.extension.umn.edu

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**Location**

**Region:** Statewide

**County Name:** Statewide

**City / Township:**

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

# Phosphorus balance on livestock farms in focus watersheds

## 1. PROJECT STATEMENT

In January of 2012, federal and Minnesota state leaders signed a memorandum of understanding on water quality. This was an important step in a process to develop a first in the nation water certification program. This University of Minnesota extension proposal; in cooperation with NCRS and SWCD personnel, is focused on two funding priorities of the LCCMR: Collection and analysis of information to further develop the state’s environmental and natural resource policies as well as directly impacting water quality not only in the focus watersheds of this study but all waters of the state and providing information for the new Minnesota Water Quality Certification Program.

**The problem** is how to reduce phosphorus reaching surface water bodies in areas like the Sauk River, Root River and Minnesota River watersheds with a high density of livestock operations and still maintain a viable livestock industry. **Minnesota livestock producers need unbiased, research based information** but there is a genuine lack of data on the interactions of phosphorus balance with feed management, nutrient management and cropping decisions to meet this challenge. The Root River, Sauk River and the Middle Minnesota River watersheds have been identified by the **US EPA** as focus watersheds in Minnesota due to high (total maximum daily load) TMDL and other pollution problems. **The US EPA will soon be imposing numeric limits for all pollutants** in each individual watershed. A frequent impairment in these areas is a high concentration of algae **due to excess phosphorus**. Stearns County, in the Sauk River watershed, has the highest number of dairy cattle of any county in Minnesota as well as other livestock. Southeast Minnesota is another area of high concentration of dairy and beef operations but with different terrain and soil types and with higher annual rainfall amounts. The Chippewa River watershed is a major watershed entering the Minnesota River just above the focus area and is in a diverse livestock area.

**The overall goal of this project is to enable livestock producers to reduce phosphorus pollution of surface waters by assessing their whole-farm P balance, identify how they can reduce imports of P in feed and/or fertilizer, and reduce P transport from fields to streams through improved manure and fertilizer management.**

## II. DESCRIPTION OF PROJECT ACTIVITIES

### Activity 1. Determine phosphorus (P) balance on farms Budget: \$50,404.00

Determine a farm nutrient balance for P on livestock farms in the Middle Minnesota, Root and Sauk River watersheds by determining imports of feed and fertilizer P, and off-farm exports of milk, meat, and manure. The goal is to evaluate 10 livestock farms from each of the three watersheds for a total of 30 farms. Data collected will include but not be limited to feed and forage analysis, forage, grain and supplements imported to the farm and amounts, diets fed and analysis, water and manure analysis and manure management plans.

Item	Start project 2013	Completion 2014	Completion 2015
Survey farm P levels in feed, forage and diets	September	December	
Determine imports and exports of P on farms		December	
Student calculates P balance on survey farms			March

### Activity 2. Determine soil phosphorus (P) levels and distribution on farms. Budget: \$54,305.00

Develop strategies for manure and fertilizer application that will reduce P transport to surface water, by determining soil P levels and distribution within and between farms in the watershed. Utilizing all available data on the 30 selected farms, soil P levels will be determined. On two or more farms in each watershed, grid sampling will be done to determine P variability within farm, field and soil type. Manure

samples will be collected prior to application and analyzed for N, P, and K. This will be used to develop the total farm P balance and strategies to optimize on-farm sources of P and minimize off farm imports.

Item	Completion 2014	Completion 2015
Survey farms for soil P balance	December	
Grid sample select farms in watershed	December	
Evaluate manure management plans of farms		July

**Activity 3. Develop extension materials, conduct workshops, present information.**

**Budget: \$79,711.00**

Develop and use teaching materials and other resources to conduct workshops and on-farm field days to assist livestock producers in reducing P levels in the watersheds and other areas of Minnesota while maintaining a viable livestock industry. Information from the on-farm assessments of phosphorus status and balance, as well as conclusions regarding practices that will effectively reduce sources and transport of phosphorus to surface waters, will be incorporated into Extension documents and web pages. This project will also be a graduate student project with thesis and presentations at scientific meetings.

Item	Start in 2014	Completion 2015
Develop extension materials		July
Conduct on farm demonstrations		August
Develop Web based learning materials		September
Present Abstract at national meeting		July
Prepare thesis and journal article		September
Survey farms for changes implemented		September
Evaluate surveys and data for impact		September

**III. PROJECT STRATEGIES**

**A. Project Teams: Principal Investigators:** Jim Paulson, 507-251-4694, [jcp@umn.edu](mailto:jcp@umn.edu), Extension Educator, Dairy; UM and Jim Salfer, [salfe001@umn.edu](mailto:salfe001@umn.edu), Extension Educator, Dairy; UM.

**Feed team:** Jim Paulson, Project Leader, [jcp@umn.edu](mailto:jcp@umn.edu), Extension Educator, Dairy; UM; Jim Salfer, Extension Educator, Dairy ;Noah Litherland, Dairy Extension Specialist; Randy Pepin, Local Extension Educator, Todd County; Craig Roerick, Local Extension Educator, Stearns and Benton County

**Soils and Manure team:** Jose Hernandez, Project Leader, [jahernan@umn.edu](mailto:jahernan@umn.edu), Extension Educator.

**Water team:** Karen Terry, Project leader, [kterry@umn.edu](mailto:kterry@umn.edu), Water resource center; Dennis Fuchs, [Dennis.Fuchs@mn.ncadnet.net](mailto:Dennis.Fuchs@mn.ncadnet.net); Holly Kovarik, Sauk River Watershed District Director; Donna Rasmussen, Root River Watershed District Director; Paul Wymar, Chippewa River Watershed project, Executive Director

**Outreach team:** Les Everett, Project leader, [evere003@umn.edu](mailto:evere003@umn.edu), UM Extension, Jim Paulson, Jose Hernandez, Karen Terry, Jim Salfer

**B. Project timeline:** This project will begin in September of 2013 to assign tasks, contact farms, and gather initial data. A full year of data will be collected in 2014 with analysis and outreach activities to be completed in 2015 as well as evaluation of impact and changes.

**C. Long-term strategy and future funding.** While this project may stimulate ideas for future projects, this study would be limited to funding and time as proposed.

## 2012-2013 Detailed Project Budget

*Attach budget, in MS-EXCEL format, to your "2012-2013 LCCMR Proposal Submit Form".*

### IV. TOTAL ENRTF REQUEST BUDGET two years

<b>BUDGET ITEM</b> <i>(See list of Eligible and Non-Eligible Costs, p. 11)</i>	<b>AMOUNT</b>
<b>Personnel:</b> Graduate Research Student 2 - years (Salary and fringe)	\$ 70,782
<b>Contracts:</b> SWCD - 150 hours @ \$45/hour	\$ 6,750
<b>Contracts:</b> Lab Analysis - grid (1176 samples @ \$15 each)	\$ 17,640
<b>Contracts:</b> Lab Analysis - soil (1176 samples @ \$30 each)	\$ 35,280
<b>Contracts:</b> Lab Analysis - forage, feed and manure (300 samples @ \$15 each)	\$ 9,000
<b>Travel:</b> Extension Educators' travel to and from farm sites (37,214 miles x .555/mile); Lodging and per diem (\$1,500)	\$ 22,154
<b>Travel:</b> 3 Workshops (4 speakers' travel x 200 miles @ .555/mi); 3 Field Days (4 speakers' travel x 200 miles @ .555/mi);	\$ 2,664
<b>Travel:</b> Abstract presentation at conferences, etc.	\$ 2,000
<b>Additional Budget Items:</b> Workshops @ \$300 each x 3 (\$900); Web hosting and Extension fact sheets (\$2,000); Journal article submissions (\$3,000)	\$ 5,900
<b>Additional Budget Items:</b> Farmer stipends for field days (3 x \$250 = \$750); Farmer participation compensation (30 @ \$250 = \$7,500); Nutritionist and crop consultants (30 @ \$100 = \$3,000)	\$ 11,250
<b>Additional Budget Items:</b> Sample bags, boots, misc.	\$ 1,000
<b>TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =</b>	<b>\$ 184,420</b>

### V. OTHER FUNDS

<b>SOURCE OF FUNDS</b>	<b>AMOUNT</b>	<b>Status</b>
<b>Other Non-State \$ Being Applied to Project During Project Period:</b>		N/A
<b>Other State \$ Being Applied to Project During Project Period:</b>	\$ -	N/A
<b>In-kind Services During Project Period:</b> Jim Paulson (10% time); Jim Salfer (10% time); Craig Roerick (2.5% time); Randy Pepin (2.5% time); Jose Hernandez (5% time); Karen Terry (2.5% time); Les Everett (2.5% time) Noah Litherland (2.5% time) Total salaries and fringe: \$63,726	\$ 66,105	N/A
<b>Remaining \$ from Current ENRTF Appropriation (if applicable):</b>	\$ -	N/A
<b>Funding History:</b>	\$ -	N/A

**James C. Paulson, M.S.**  
*Curriculum Vitae*

Extension Educator – Dairy  
Extension Center for Food, Agricultural and Natural Resource Sciences  
University of Minnesota Extension

**CONTACT INFORMATION**

Extension Regional Office, Rochester  
863 30<sup>th</sup> Ave SE  
Rochester, MN 55904  
Office phone: 507-536-6310  
Cell phone: 507-251-4694  
Fax: 507-280-2872  
Email: [jcp@umn.edu](mailto:jcp@umn.edu)

**EDUCATION**

1989           **Master of Science** – Dairy Science, University of Minnesota, Twin Cities  
  
1978           **Bachelor of Science** – Animal Science, University of Minnesota, Twin Cities

**PROFESSIONAL EXPERIENCE**

2007 –           **Extension Educator – Dairy and Assistant Professor.** Extension  
Present       Center for Food, Agricultural and Natural Resource Sciences, University of  
Minnesota Extension. Rochester, MN.

**Key tasks:**

- Design, implement, and evaluate educational programs primarily for dairy producers, their families, and industry stakeholders. Programs will promote the use of principles including research- based best management practices and sustainability; including economic, environmental and social aspects. Collaborators include university dairy resources and other faculty, staff; dairy producers, state and federal agencies, industry, and non-profit institutions throughout the region and state.
- Foster integration of applied research and educational outreach programs.
- Ensure that Extension programs, facilities, and committees are accessible to new, diverse, and historically underserved audiences.
- Continue professional development in scholarship, program development, and delivery.

