

**Environment and Natural Resources Trust Fund  
2014 Request for Proposals (RFP)**

---

**Project Title:**

**ENRTF ID: 050-B**

Restoring Groundwater and Trout Habitat Through Irrigation Efficiencies

---

**Category:** B. Water Resources

---

**Total Project Budget: \$** 490,649

**Proposed Project Time Period for the Funding Requested:** 3 Years, July 2014 - December 2017

**Summary:**

Restoring Little Rock Creek trout stream flow by reducing irrigation groundwater demand. Multiple benefits achieved using proven and innovative technologies and involving producers in designing solutions. Outcomes are transferable statewide.

---

**Name:** Gerry Maciej

**Sponsoring Organization:** Benton County Soil and Water Conservation District

**Address:** 14 2nd Avenue W  
Foley MN 56329

**Telephone Number:** (320) 968-5300 x3

**Email** gerry@soilandwater.org

**Web Address** www.soilandwater.org

---

**Location**

**Region:** Central

**County Name:** Benton, Morrison

**City / Township:**

---

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



## Restoring Groundwater and Trout Habitat Through Irrigation Efficiencies

### I. PROJECT STATEMENT

Little Rock Creek is a trout stream in central Minnesota impaired for cold-water fisheries, low dissolved oxygen, and nitrates in drinking water. Its small watershed (70 sq. miles) has a relatively large groundwater area (337 sq. miles). Irrigation is especially important in these sandy soils that have little natural water holding capacity. Similar to other areas of the state, groundwater demand for crop irrigation has increased dramatically in this watershed. The recent TMDL completed (draft) identified reduced stream flow, high temperature, low dissolved oxygen, and high nitrate as likely stressors to the Little Rock Creek's trout community. Groundwater use and Little Rock Creek flow levels are linked. **The goal of this demonstration project is to reduce groundwater use thereby restoring flow in the Little Rock Creek trout stream.** Additionally, the project will demonstrate that this can be accomplished while obtaining multiple benefits for producers, such as increased yield and reduced inputs, using proven conservation practices and innovative technologies that involve producers in resource management. The outcomes of this project can be applied in other areas of the state facing similar issues.

This project's outcomes will be achieved through implementing three initiatives simultaneously:

- 1) Increasing irrigation efficiency, including use of irrigation scheduling and variable rate technologies, has been shown to decrease water use by 30% while improving yields 5% and decreasing energy use up to 35%.
- 2) Improving soil health, such as increasing soil organic matter, on sandy soils. Reduced till methods when combined with cover crop practices can reduce irrigation needs by as much as 5" of water due to better infiltration, increased water holding capacity, and reduced evapotranspiration.
- 3) Maintaining critical stream flow using a decision support system that integrates creek flow, soil moisture balance, and forecasting and provides real-time condition appropriate irrigation methods to producers.

Through collaboration with producers, the project will demonstrate at a watershed scale that increased adoption of voluntary conservation practices will lead to significant progress on several integrated resource concerns: 1) restoration of creek flow conditions suitable to support a trout population, 2) conservation of limited groundwater, and 3) reduction of impacts from excess nutrients to the Mississippi River in the City of St. Cloud's source water protection area. Finally, the successful completion of this farmer-led project will demonstrate the potential to mitigate the need for regulatory programs that restrict irrigation on farmland.

### II. DESCRIPTION OF PROJECT ACTIVITIES

**Activity 1:** Increased adoption of irrigation and soil conservation practices, such as irrigation scheduling, variable rate technology, reduced till, and cover crops.

**Budget: \$164,615**

Conservation technicians will target producers with the greatest pumping capacity and potential to impact surface water flows. Soil health practices will be integrated into production systems using the NRCS soil health checklist. Irrigation applications will be optimized through irrigation system calibration, irrigation scheduling, and variable rate technologies. An online irrigation scheduling assistant, customized to each individual producer, will be developed. Variable rate technology will be employed on two producers' center pivot systems to demonstrate the benefits of precision applications.

Outcome	Completion Date
1. Producers prioritized, technical team consulted, targeting strategy implemented	Annual
2. 30% of targeted producers adopted irrigation management and soil health practices (10% per year on average)	Fall 2017

**Activity 2:** Conservation Irrigation Decision Support System (CIDSS)

**Budget: \$147,016**

A decision support system will be developed that provides daily information on condition appropriate conservation irrigation methods. Recommended methods will be delivered via web or other appropriate



## Environment and Natural Resources Trust Fund (ENRTF)

### 2014 Main Proposal

#### Project Title: Restoring Groundwater and Trout Habitat Through Irrigation Efficiencies

technology. Local producers will develop the decision point criteria for implementing the specific conservation measures that optimize crop production and stream health at various flow levels. Simple indicators of irrigation categories, such as a stoplight approach (green = standard rate; yellow = conservation rates; red = deficit irrigation rates) will be developed to inform producers on the appropriate irrigation methods to be implemented.

Outcome	Completion Date
1. <i>Producer group established and initial decision point criteria developed</i>	<i>Winter 2015</i>
2. <i>CIDSS program developed, beta tested, and implemented with training and full launch</i>	<i>Spring 2015</i>
3. <i>Annual stakeholder program review, updates of decision point criteria, outreach</i>	<i>Annual, winter</i>

#### Activity 3: Evaluation of effectiveness and progress towards project goals

**Budget: \$113,418**

Data will be collected throughout the growing season during years 2 and 3 to evaluate the effectiveness of activities toward program goals. Creek water quality monitoring will evaluate the impact of conservation systems, crop yield data will be used to evaluate production improvements, and soil testing will evaluate soil conditions. Reports on program effectiveness will be developed and communicated to various audiences. An adaptive management approach will be implemented, through critical review of each year's outcomes.

Outcome	Completion Date
1. <i>Data collection and analysis on creek water quality, crop yield, and soil testing</i>	<i>Spring-Fall, 2 yrs.</i>
2. <i>Annual reporting on program effectiveness, working with the technical team to adapt program implementation strategies based on effectiveness results</i>	<i>Annually</i>

#### Activity 4: Outreach, promotion, and sharing results throughout the state

**Budget: \$97,600**

Outreach, conservation, and irrigation experts will demonstrate the benefits of conservation practices to producers through multiple channels including irrigators and crop growers associations, farm visits, field days, websites, and traditional mailings. Project results will be shared statewide with the agricultural and natural resource community at conferences, and through project reports, websites, and other channels as appropriate.

Outcome	Completion Date
1. <i>Outreach team established, experts develop and update materials regularly with new information and messages</i>	<i>On-going</i>
2. <i>4 field days, event, conferences/year for target audience and stakeholders</i>	<i>Summer 2017</i>
3. <i>Demonstration of technology and program results, both annually and upon completion, (minimum of 3 events/year).</i>	<i>On-going</i>

### III. PROJECT STRATEGY

#### A. Project Team/Partners

Benton County SWCD, Morrison County SWCD (Helen McLennan), Minnesota DNR (Dan Lais), MPCA (Maggie Leach), Dept of Agriculture (Mark Dittrich), BWSR (Jason Weinerman), NRCS (Mike Walczynski), Central Minnesota Irrigators Association.

#### B. Timeline Requirement

The first full growing season (2015) will focus on implementing conservation practices and launching the irrigation decision support system. These activities and data collection will continue through summer of 2016 and 2017. In order to report on two full seasons of data it is essential that this project conclude December 2017.

#### C. Long-Term Strategy and Future Funding Needs

This project will provide tools and technologies transferable to other areas of the state. Funding for on-going support of the decision support system will need to be secured for continuation of effort.

## 2014 Detailed Project Budget

**Project Title: Restoring Groundwater and Trout Habitat Through Irrigation Efficiencies**

### IV. TOTAL ENRTF REQUEST BUDGET 3.5 years

<b>BUDGET ITEM</b>	<b>AMOUNT</b>
<b>Benton County SWCD Personnel:</b>	
Manager; 0.13 FTE; 77% salary, 23% benefits; July 2014 -December 2017; one person.	\$ 31,600
Technician; 0.2 FTE; 77% salary, 23% benefits; July 2014 -December 2017; three people.	\$ 103,992
No backfilling of positions is required. Portions of these positions are covered by soft funding.	
<b>Contracts:</b>	
Development of Conservation Irrigation Decision Support System, integrated with stream flow and water quality monitoring, data analysis, and report writing (Engineering Firm; To Be Determined). Involves setting up the stream monitoring stations, developing the software that integrates the modules, developing the website and applications, as well as maintenance and updates over the life of the grant.	\$ 205,510
Demonstration, training, support on variable rate technology (Irrigation Expert Consultant; To Be Determined)	\$ 15,000
Outreach, technology transfer. Involves developing audience appropriate materials for multiple technologies for increasing producer involvement. (Consultant; To Be Determined)	\$ 51,480
<b>Equipment/Tools/Supplies:</b>	
Variable Rate Technology equipment and installation for two producers to be used as demonstration projects (50% cost share incentive; \$32,000 full price for each system). The 50% cost share is an incentive for the producer to purchase and own the equipment, while participating in the project as a demonstration site, sharing data and results for the purposes of the project, and allowing outreach activities on their farm operation. This equipment will not be owned by the SWCD because it is not easily transferable and should be installed permanently.	\$ 32,000
One weather station and two sets of stream discharge and temperature monitoring equipment (\$11,444); rain gauges for farm operations (20 gauges at \$300/gauge); soil moisture sensors and data loggers for farm operations (20 sets at \$357/set); equipment maintenance and repair (\$3,000); cell data plan (up to \$75/month)	\$ 30,284
Lab testing: water quality testing (\$2,064/yr for 2 years); soil quality testing (approx. 96 samples at \$26/sample)	\$ 6,628
Materials for outreach and education (workshops, meeting space), field days (field supplies)	\$ 4,000
<b>Travel (vehicle mileage):</b> Biweekly visits to monitoring sites for 6 months/yr for 3 yrs; farm operation visits over the course of the project for irrigation scheduling, uniformity checks, and soil health practices; field visits for outreach and technology transfer	\$ 10,155
<b>TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =</b>	<b>\$ 490,649</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> USDA program funds, \$75K; Landowner/sponsor contribution for the variable rate technology equipment on demonstration sites, \$32,000. It is expected that this project will leverage additional USDA NRCS funds through the EQIP and CSP programs. Additionally, historically underserved producers (beginning, disadvantaged, limited resource) receive higher payment rates for conservation practices and will be given priority in order to provide additional resources for these producers that participate in this program.	\$ 107,000	Pending (EQIP)
<b>Other State \$ Being Applied to Project During Project Period:</b> Benton SWCD Clean Water Legacy Funds, BWSR, \$50K (Secured); BWSR Cost-Share, \$20K (Pending). The project team will seek opportunities to leverage and enhance this project's effectiveness throughout the life of the LCCMR grant.	\$ 70,000	\$50K Secured; \$20K Pending
<b>In-kind Services During Project Period:</b> NRCS Staff Time, \$44K; DNR Staff Time, \$14K; MPCA Staff Time, \$14K; BWSR Staff Time, \$14K; MDA, \$14K. Landowners estimated in-kind practice contribution, \$20K; in-kind volunteer stakeholder involvement, \$6K; in-kind volunteer time for data collection, \$9K; Benton County in-kind, \$2K.	\$ 137,000	Pending
<b>Funding History:</b> BWSR Clean Water Fund Irrigation Grant, \$84,211; BWSR Clean Water Fund Accelerated Implementation Grant, \$55,410;	\$ 139,621	Secured



# INITIATIVES

## 1 IMPROVE IRRIGATION EFFICIENCIES



- CUSTOM FIELD IRRIGATION SCHEDULING VIA WEB
- VARIABLE RATE IRRIGATION TECHNOLOGY
- CALIBRATING IRRIGATION EQUIPMENT

## 2 IMPROVE SOIL HEALTH



- COVER CROPS, REDUCED TILL PRACTICES
- INCREASE SOIL ORGANIC MATTER
- IMPROVE SOIL WATER HOLDING CAPACITY
- REDUCE RUNOFF AND IRRIGATION DEMANDS

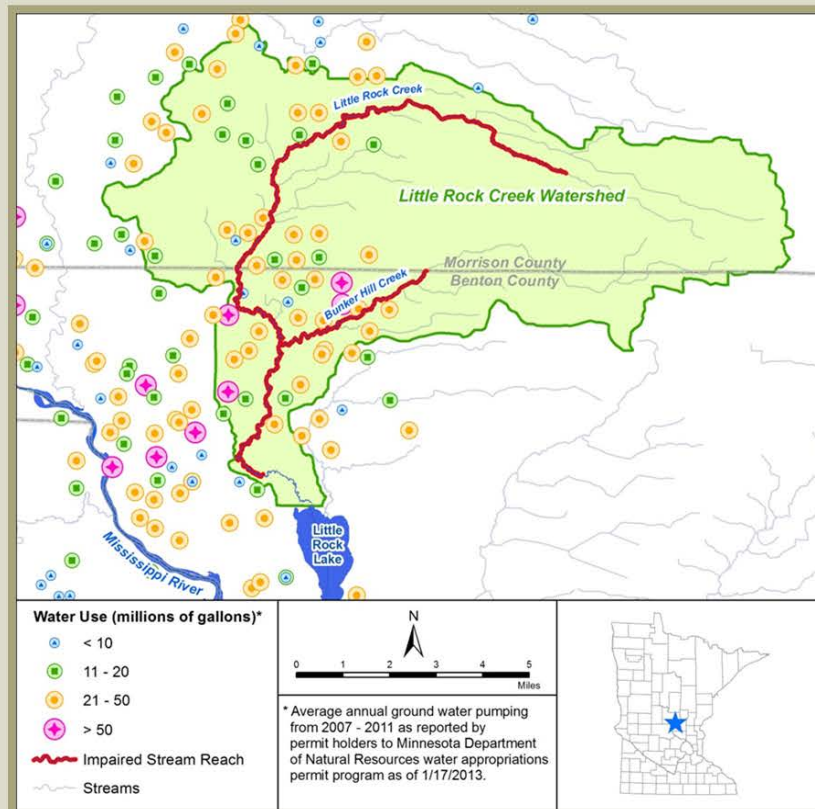
## 3 IMPLEMENT DECISION SUPPORT SYSTEM



- INTEGRATED FLOW, SOIL MOISTURE, FORECASTING
- REAL-TIME CONDITION APPROPRIATE IRRIGATION METHODS
- METHODS DETERMINED BY PRODUCERS

# RESTORING GROUNDWATER AND TROUT HABITAT IN LITTLE ROCK CREEK

THROUGH VOLUNTARY ADOPTION OF IRRIGATION AND SOIL CONSERVATION PRACTICES



# OUTCOMES

## INCREASED GROUNDWATER

- REDUCED IRRIGATION DEMANDS
- PRODUCER-DRIVEN VOLUNTARY PROGRAM

## IMPROVED TROUT STREAM CONDITIONS

- REDUCED GROUNDWATER INTERFERENCE
- INCREASED STREAM FLOW
- DECREASED STREAM TEMPERATURE

## IMPROVED WATER QUALITY

- LESS IRRIGATION REDUCES RUNOFF
- IMPROVED SOIL HEALTH REDUCES NUTRIENT APPLICATION AND SOIL EROSION

## IMPROVED PRODUCER PROFITABILITY

- LESS IRRIGATION REDUCES ENERGY COSTS
- IMPROVED SOILS REDUCE NUTRIENT APPLICATION
- INCREASED YIELDS FROM IMPROVED SOIL HEALTH



## **Restoring Groundwater and Trout Habitat Through Irrigation Efficiencies**

### **Project Manager Qualifications**

#### **Project Manager: Gerry Maciej, Manager, Benton County Soil and Water Conservation District**

Gerry Maciej has been employed with Benton SWCD since 1996 and has held the positions of District Technician and Water Plan Technician. He has been the District Manager since 2006.

Gerry's responsibilities are to provide leadership and management of all programs, staff, and operations of the SWCD including financial management, with an annual budget of approximately \$500,000. The SWCD has received several grants related to the adoption of groundwater and irrigation best management practices and he has been assigned the duties of principle project manager for all of them. One example is the 2011 BWSR Clean Water Legacy grant titled "Little Rock Impaired Waters Kickoff". This grant included a new watershed wide irrigation water management program. The Benton County SWCD has a proven track record of implementing conservation practices by building effective partnerships with the agricultural community and leveraging local, state and federal funding programs to address local resource concerns.

Gerry served as the Benton SWCD manager for both the Little Rock Lake TMDL and Little Rock Creek TMDL. The studies included management of multiple contracts with the MPCA and sub-contracts with consultants William Walker, Wisconsin Department of Natural Resources, U.S. Army Engineer Research and Development Center, Natural Resources Research Institute, Minnesota Valley Testing Laboratories and Barr Engineering.

He holds an Associate in Applied Sciences degree in Natural Resources Technology from Brainerd Community College, Brainerd MN and Bachelor of Science degree in Watershed Management from the University of Wisconsin, Stevens Point, WI.

#### **Organization Description:**

The Benton SWCD, established in 1948, is a local unit of government that manages and directs natural resource management programs at the local level. We work in both urban and rural settings, with landowners and with other units of government, to carry out a program for the conservation, use, and development of soil, water, and related resources. Benton SWCD is political subdivisions of the State, authorized under Minnesota Statutes Chapter 103C. Our five supervisors serve four year staggered terms, elected during the general election in November. It is the mission of the Benton SWCD to protect and enhance Benton County's soil, water, and other natural resources; to nurture a conservation ethic by educating county residents on conservation and environmental issues.