

Trust Fund 2009 Work Program

Date of Report: 1 July 2009

Date of Next Progress Report: 31 December 2009

Date of Work Program Approval:

Project Completion Date: 30 June 2011

I. PROJECT TITLE: Innovative Springshed Mapping for Trout Stream Management-Continuation

Project Manager: Jeff Green
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Location: Houston, Fillmore, Mower, Olmsted, Winona, Wabasha, Goodhue, Dodge, Dakota and Washington Counties.

Total Trust Fund Project Budget:	Trust Fund Appropriation	\$	250,000
	Minus Amount Spent:	\$	0000
	Equal Balance:	\$	250,000

Legal Citation: M.L. 2009, Chp. 143, Sec. 2, Subd. 3d

Appropriation Language: Springshed Mapping for Trout Stream Management.

\$500,000 is from the trust fund to continue to identify and delineate supply areas and springsheds for springs serving as coldwater sources for modern and historic trout streams and to assess the impacts from development and water appropriations. Of this appropriation, \$250,000 is to the Board of Regents of the University of Minnesota and \$250,000 is to the commissioner of natural resources.

II. PROJECT SUMMARY AND RESULTS: Trout streams depend on a steady supply of clean, cold water to exist. Minnesota's karst lands contain 173 designated trout streams each of which is sourced from springs. Those trout springs are under increasing pressure from changing land use. Additional large groundwater withdrawals for energy production and other development loom in the future. Delineation of the recharge areas or springsheds of the trout springs is a crucial first step in the protection of the trout fisheries and the restoration of those that have been degraded. This project is to develop innovative identification and delineation tools to determine the supply areas (springsheds) for springs serving as coldwater sources for modern and historic trout streams and assessing impacts on them from land and water development.

III. PROGRESS SUMMARY AS OF (31 December 2009)

IV. OUTLINE OF PROJECT RESULTS:

Result 1: Innovative Trout Springshed Maps and Reports

Description: Springsheds that feed source springs of trout streams will be delineated in the Galena, Prairie du Chien, and St. Lawrence karst lands. Dye tracing will be expanded in the Prairie du Chien and Galena karsts. We will also do dye tracing in the St. Lawrence Formation which has been viewed as a confining unit. During the first two years of this project, we have run several dye traces through it and will do more as suitable locations are found. Maps of the springsheds will be transferred to the U of M for web posting and will be linked to the DNR web site.

The existing temperature-monitoring network will be maintained and expanded as equipment and sites are available.

Summary Budget Information for Result 1:

Trust Fund Budget:	\$ 440,211
(to U of MN.)	\$ 190,211)
(to MNDNR)	\$ 250,000)
Amount Spent:	\$ 000
Balance:	\$ 440,211

Deliverable	Completion Date	Budget
1. Innovative Trout Springshed Maps and Reports (Conduct dye traces and field investigations for springshed map production for counties listed under Location on page 1, maps and reports of completed traces and spring parameter monitoring)	30 June 2011	\$250000

(See also the companion U of M project work program Result 1)

Result Status as of 31 December 2009:

Result Status as of 30 June 2010:

Result Status as of 31 December 2010:

Final Report Summary: 30 June 2011:

Result 2: Web Accessible Trout Springshed Maps and KFDB (to be completed by the U of M who will be providing separate work program updates):

Description: The springshed maps as they are produced and updated will be useful to resource managers. They need to be accessible in a user-friendly web site. The MN Karst Features Data Base (KFDB) exists and is and will continue to be an integral part of the springshed mapping project. The KFDB will be

updated, made more web accessible and user friendly. Web sites will be designed to facilitate user access to the springshed maps and the data in the KFDB.

Summary Budget Information for Result 2 (updates will be provided by the U of M):

Trust Fund Budget:	\$ 59,789
Amount Spent:	\$ 000
Balance:	\$ 59,789

V. TOTAL TRUST FUND PROJECT BUDGET:

	MNDNR	U of MN	Total
Personnel:	\$ 202,500	\$ 171,291	\$ 373,791
Contracts:	000	\$ 28,000	\$ 28,000
Equipment/Tools/Supplies:	\$ 16,000	\$ 30,000	\$ 46,000
Travel:	\$ 29,000	\$ 20,709	\$ 49,709
Other:	\$ 2,500	000	\$ 2,500
Totals:	\$250000	\$250000	\$ 500000

(ARCGIS Training & Out-of-State Travel to National meetings to present results and to learn from colleagues in other states.)

TOTAL TRUST FUND PROJECT BUDGET: \$ 500,000

Explanation of Capital Expenditures Greater Than \$3,500: n/a

VI. PROJECT STRATEGY:

A. Project Partners:

Jeff Green will be DNR project manager and will be responsible for carrying out the DNR share of project activities. He is a classified state employee. His current position of Regional Ground Water Specialist will be backfilled.

Dr. E. Calvin Alexander, Jr. will be the project manager of the companion U of M project and will be responsible for carrying out the U of M share of project activities.

Dr. Yongli Gao will be a contractor who is responsible for developing the GIS-based web site for public access to the springshed maps and updating the Minnesota Karst Features Database (MN KFDB) to make it more user friendly and accessible (Result 2 of the companion U of M study). Gao designed and implemented the current MN KFDB and is currently working with the USGS on a National Karst Features Data System. He is an Assistant Professor at East Tennessee State University in Johnson City, TN.

Dr. Anthony C. Runkel will be contributing stratigraphic information to Result 1 of this project. Tony is the Minnesota State Geologist with the Minnesota Geological Survey. He has done extensive work on the karst hydrostratigraphy of southeastern Minnesota.

Robert G. Tipping is a Senior Scientist with the Minnesota Geological Survey. Bob currently maintains the MN KFDB. He has also done pioneering work on the karst hydrostratigraphy of southeastern Minnesota.

B. Project Impact and Long-term Strategy: By delineating springsheds and making web-based maps available, this project will provide critical information for the protection and management of the springs that form the coldwater streams of southeast Minnesota. This information is critical for Total Maximum Daily Load (TMDL) implementation strategies, impaired waters remediation, ground water protection and allocation issues, and local land and water management decisions.

Karst ground water flow is the most complex hydrogeologic environment in Minnesota. Springs are the natural features that return groundwater to surface waters. Karst springs respond much faster to surface recharge than is expected from conventional hydrology theory. Karst springs exhibit a wide range of rapid responses to recharge events. Springs integrate all of the natural and anthropogenic processes that occur in their recharge areas – in their individual springsheds. Springshed mapping is critical component of karst aquifer characterization. Long-term resources are needed to gather and maintain the parameters necessary to realistically, effectively manage karst springs in Minnesota and to train staff and resource managers in the use of the available karst data. LCMR and LCCMR have played a leading role in the effort to understand and manage Minnesota's karst springs

The availability of high-resolution LiDAR maps, scheduled for July 2009, will produce a flood of new information showing the locations of karst features. We anticipate that new information will have a major impact on the springshed mapping project.

C. Project Partners: University of Minnesota, total from appropriation \$25000

D. Other Funds Proposed to be spent during the Project Period: DNR Waters staff project support \$10822 (0.05 FTE General Fund).

E. Spending History: \$125,000 from the trust fund via a contract between the U of M and the DNR, 1 July 2007 to 30 June 2009.

VII. DISSEMINATION: GIS-based maps and written reports of the springsheds will be prepared and disseminated to the LCCMR, interested residents and to local, regional and state resource managers and regulators interested in specific targeted areas. Interim dye trace results will be available as GIS shape files and derived products on a dye trace by dye trace basis. Data tables of discharge and chemistry will be available as developed.

VIII. REPORTING REQUIREMENTS: Periodic work program progress reports will be submitted not later than 31 December 2009, 30 June 2010, 31 December 2010. A final work program report and associated products will be submitted between June 30 and August 1, 2011 as requested by the LCCMR.

IX. RESEARCH PROJECTS:

Attachment A:					
Project Title: Innovative Springshed Mapping for Trout Stream Management-Continuation					
Project Manager Name: Jeff Green					
Trust Fund Appropriation: \$ 250,000					
2009 Trust Fund Budget	<u>Result 1 Budget:</u>	Amount Spent (date)	Balance (date)	TOTAL BUDGET	TOTAL BALANCE
	Innovative Trout Springshed Maps and Reports				
BUDGET ITEM					
PERSONNEL: wages and benefits Hydrologist 3 (Jeff Green) 100%	202,500				
Contracts					
Professional/technical					
Other contracts					
Other direct operating costs					
Non-capital Equipment / Tools (Field equipment such as auto-samplers (1-3 @ approx.\$3200 each), flume/weir for spring flow measurement (1 @ approx. \$1500) , dataloggers to measure spring parameters 2-3 @ approx. \$1400), netbook computer for datalogger download approx. \$350, temperature loggers 10 @ \$60.00,and other misc. items less than \$600 each (ex. waders for spring flow measurement).	14,000				
Office equipment & computers					
Capital equipment over \$3,500					
Land acquisition					
Easement acquisition					
Professional Services for Acq.					
Printing					
Supplies (dye, charcoal, labels, bottles etc.) Three dyes, minimum order is approx. \$850.00, each dye trace uses .25-2.0 Kg. Plan to do 24 dye traces.	2,000				
Travel expenses in Minnesota					
DNR Fleet vehicle costs	28,000				
Meals & Lodging for fieldwork	1,000				
Travel outside Minnesota: 12th Multidisciplinary Conference on the Environmental and Engineering Aspect of Karst, St. Louis, MO in 2010 to present results and to learn from colleagues in other states. Transportation, conf. fee, lodging and meals	1,250				
Other ARCGIS training and other hydrogeology & karst training in MN such as the Driftless Area Symposium, Southeast Minnesota Water Resources Board workshops, and LIDAR data training	1,250				
COLUMN TOTAL	\$250,000	\$0	\$250,000	\$0	\$0

