

2008 Project Abstract

For the Period Ending June 30, 2010

PROJECT TITLE: Soil Survey

PROJECT MANAGER: Megan Lennon

AFFILIATION: Minnesota Board of Water and Soil Resources

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FUNDING SOURCE: Environment and Natural Resources Trust Fund

LEGAL CITATION: \$400,000 is from the trust fund to the Board of Water and Soil Resources for soil survey mapping and interpretation efforts in areas of the state, including Crow Wing, Pine, Cook, Lake, and Isanti Counties, and to accelerate the delivery of soils data through the Internet as a Web-based soil survey. The new soil surveys must be done on a cost-share basis with local and federal funds.

APPROPRIATION AMOUNT: \$400,000

Overall Project Outcome and Results

Accurate soils information is essential for evaluating the potential for land to support development, crop and forest production, and for identifying the most suitable locations for conservation practices and other land uses. Readily accessible local soil information is critical to informing conservation decisions and provides a foundation for sustainable land use planning. The soil survey is the mechanism for how this basic natural resource information is made available to land use authorities and landowners to make the best land use decisions.

In the ongoing, multi-year project to map, classify, interpret, and Web-publish an inventory of the soils of Minnesota, this one-year phase of the project focused on accelerating the completion of a Statewide soil survey, increase soil mapping in targeted areas, and enhancing soils data through increased sample collection, availability, and interpretation. Specifically:

1. 71,000 acres mapped in Crow Wing County;
2. 32,000 acres mapped in Pine County;
3. 85,000 acres mapped in Koochiching County;
4. 80,000 acres mapped in the Crane Lake subset of St. Louis County;
5. Data from 1,000 soil samples (some dating back to the 1970's) were interpreted for the first time and incorporated into Soil Surveys for many Minnesota counties;
6. Landuse effects on soil carbon were determined on 118 sites in 14 counties throughout the State, this data can be used to develop soil carbon management guidance.

The soil survey project was extremely successful and many of the mapping goals were exceeded. Mapping surpassed initial acreage goals in both Crow Wing and Pine Counties, and the soil surveys for Koochiching and St. Louis Counties were completed 1 year ahead of schedule. A report detailing the results of re-analysis of lab samples from the 1970's highlighting landuse impacts on soil carbon will be available in January 2011.

Project Results Use and Dissemination

The Soil Survey project funded by the Minnesota Environment and Natural Resources Trust Fund is highlighted as a BWSR feature project (www.bwsr.state.mn.us/projects/soil_survey.pdf) on the Agency's homepage. All the data, mapping information, and interpretations are available

on the Web Soil Survey as a user-friendly, GIS-based application. Web Soil Survey provides soil data and information produced by the National Cooperative Soil Survey. It is operated by the USDA Natural Resources Conservation Service (NRCS) and provides access to the largest natural resource information system in the world.

**Trust Fund 2008 Work Program Final Report
Trust Fund 2009 Work Program**

Date of Report: December 28, 2010
Final Report
Date of Next Progress Report: January 2011
M.L. 2008 **M.L. 2009**
Date of Work Program Approval: June 10, 2008 June 16, 2009
Project Completion Date: June 30, 2010 June 30, 2011

I. PROJECT TITLE: Soil Survey

Project Manager: Megan Lennon
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Location: Crow Wing, Isanti, Koochiching, Lake, Cook and Saint Louis.
 Web-based delivery has statewide applicability.

Total Trust Fund Project Budget:	M.L. 2008	M.L. 2009	Total
Trust Fund Appropriation:	\$400,000	\$400,000	\$800,000
Minus Amount Spent:	\$400,000	\$219,395	\$619,395
Equal Balance:	\$0	\$180,605	\$180,605

Legal Citation:

M.L. 2008, Chap. 367. Sec. 20, Subd. 5(b)

2008 Appropriation Language:

\$400,000 is from the trust fund to the Board of Water and Soil Resources for soil survey mapping and interpretation efforts in areas of the state, including Crow Wing, Pine, Cook, Lake, and Isanti Counties, and to accelerate the delivery of soils data through the Internet as a Web-based soil survey. The new soil surveys must be done on a cost-share basis with local and federal funds.

Legal Citation: M.L. 2009, Chap. 143, Sec. 2, Subd. 3c

2009 Appropriation Language:

\$400,000 is from the trust fund to the Board of Water and Soil Resources to accelerate the county soil survey and mapping and Web-based data delivery. This appropriation represents a continuing effort to complete the mapping. The soil surveys must be done on a cost-share basis with local and federal funds.

II. and III. FINAL 2008 PROJECT SUMMARY

Overall Project Outcome and Results

Accurate soils information is essential for evaluating the potential for land to support development, crop and forest production, and for identifying the most suitable locations for conservation practices and other land uses. Readily accessible local soil information is critical to informing conservation decisions and provides a foundation for sustainable land use planning. The soil survey is the mechanism for how this basic natural resource information is made available to land use authorities and landowners to make the best land use decisions.

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IV. 2009 PROJECT SUMMARY AND RESULTS:

M.L. 2009

This project will continue to accelerate the completion of soil mapping and digitization by complementing efforts underway by the USDA Natural Resources Conservation Service. Specifically, this project will eventually produce detailed soil survey information for Crow Wing, Lake, Cook and (the Crane Lake subset of) Saint Louis Counties. Delivery of data will be Web-based. Efficiencies will be achieved by utilizing retired NRCS soil scientists and by detailing, to Minnesota, NRCS soil scientists employed in other states. Several soil scientists will be similarly employed and will map an additional 50,000 acres.

V. PROGRESS SUMMARY AS OF:

August 20, 2009:

M.L. 2009: N/A at this time. Contracts are being prepared.

January 19, 2010:

M.L. 2009: A contract with Crow Wing County is finalized and contracts with Lake and Cook Counties and the NRCS are in discussion.

April 15, 2010:

Amendment Request (April 15, 2010)

Funds are shifted from the NRCS (result 2) to Lake and Cook Counties (result 1) to contract for soil scientists to work under the direction of NRCS and BWSR. This will better facilitate the completion of mapping in Lake and Cook Counties. **Amendment Approved: 5/7/2010**

June 24, 2010

Amendment Request (6/24/2010)

Funds are shifted from NRCS (result 2) to a contract with a retired soil scientist (result 3). BWSR will be directly contracting with the retired soil scientist to do interpretation and database rather than NRCS contracting with the retired soil scientist as originally noted in the April 15, 2010 work plan. The completion date of result 2, deliverable 2 has been extended to June 30, 2011 to facilitate the completion of interpretation and web availability of an additional 1,000 samples. **Amendment Approved 6/24/2010**

July 13, 2010:

M.L. 2009: Contracts for all results have been encumbered and work is underway. These activities involve Crow Wing, Cook and Lake Counties, NRCS and a private sector soil scientist. As of 7/13/10 BWSR has not received an invoice for work done on the previously mentioned contracts.

December 30, 2010

M.L. 2009: Work in underway Crow Wing, Lake and Cook Counties as well as the St. Louis Crane Lake subsection of St. Louis County. Contracted work to complete lab interpretation and web availability (result 2, deliverable 2) is nearing completion.

VI. OUTLINE OF PROJECT RESULTS:

Soil surveys contain information essential to the management of natural resources. Many of the technical specifications for the protection and restoration of soil, water, wetlands and habitats require the consideration of soils data. For many years, the State of Minnesota has supported the efforts of the USDA Natural Resources Conservation

Service to map the soils of this state. During the last three years, soils data have become available through the Internet (Web Soil Survey). Before soils data can be delivered through the Internet, soils must be mapped and digitized. Progress is being made to complete this task. (Lake and Cook, the last two counties, have signed agreements with NRCS to complete their soil survey.) However, the NRCS estimates that at current staffing levels, ten or more years are needed to complete the state. This proposal will accelerate the completion and includes funding to continue county government support for soil mapping and digitizing, accelerate soil mapping and update and reinterpret older soils data. To accomplish these tasks, efficient and timely use will be made of former and current NRCS soil scientists. Soils data, some of it older, will be updated for modern interpretations and delivered through the Web Soil Survey.

Result 1: “Support county government efforts to complete the soil survey for the state”. Crow Wing, Pine, Cook and Lake Counties are the final counties in the plan to complete a soil survey for the State. For Crow Wing and Pine Counties, the cost of completing the soil survey is borne by the USDA, state and county in (approximately) a 70/20/10 distribution, respectively. (Contributions to soil survey costs in Isanti and the survey areas in the NE are varied and include LCMR, USDA and county cost-sharing arrangements.) Result 1 will generate about \$100,000 per year of local cost-share in the form of cash, office space and soil survey-related equipment and products.

Summary Budget Information for Result 1:

	M.L. 2008	M.L. 2009	Total
Trust Fund Budget:	\$150,000	\$235,000	\$385,000
Amount Spent:	\$150,000	\$0	\$150,000
Balance:	\$ 0	\$235,000	\$235,000

Deliverable	Completion Date	Budget	General Status (See details below)
1. 2008: About 70,000 acres will be addressed in Crow Wing County by existing NRCS staff. The NRCS has now fully staffed this survey with three soil scientists.	June 30, 2010	\$75,000	Acreage goals were met and budget was spent.
2. 2008: About 15,000 acres per year will be addressed in Pine County by existing NRCS staff. The NRCS intends to add two or more soil scientists to this survey. The state supported accelerated program is ending: no additional state funded soil scientists will be added for 2009.	June 30, 2010	\$75,000	Although county and state participation has ended, NRCS exceeded acreage goals. The

			budget was spent.
3. 2009: About 150,000 acres will be addressed in Crow Wing County by existing NRCS staff.	June 30, 2011	\$75,000	Ongoing. As of July 2010 about 250,000 acres have been addressed. Digital soils data for the 83,000 acre Glacial Lake Brainerd area will be posted on the WEB in September 2010. An additional 13,000 have been addressed as of 12/30/2010.
4. 2009: About 85,000 acres will be addressed in Lake County by existing NRCS staff and soil scientists contracted by the county. The NRCS currently has one soil scientist assigned to this survey who will also assist with quality control. Amendment approved: 5/7/2010	June 30, 2011	\$107,000	NRCS is "gearing up", and are supervising four soil scientists jointly hired by Lake and Cook Counties. About 66,000 acres have been addressed as of December 2010.

<p>5. 2009: About 42,000 acres will be addressed in Cook County by existing NRCS staff and soil scientists contracted by the county. The NRCS currently has one soil scientist assigned to this survey who will also assist with quality control. Amendment approved: 5/7/2010</p>	<p>June 30, 2011</p>	<p>\$53,000</p>	<p>NRCS is “gearing up” are supervising four soil scientists jointly hired by Cook and Lake Counties. About 38,000 acres have been addressed as of December 2010.</p>
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Result Completion Date:

M.L. 2008: June 30, 2010. The proposed allocation is \$75,000 each to Crow Wing and Pine Counties for 2008. These funds will be used to support their agreement with the USDA NRCS.

M.L. 2009: June 30, 2011. The proposed allocation is \$75,000 to Crow Wing County and \$37,500 each to Lake and Cook Counties for 2009. These funds will be used by the counties to support their agreement with the USDA NRCS.

Result Status as of August 20, 2009:

M.L. 2009: Contract discussions are underway with Crow Wing, Lake and Cook Counties and NRCS.

Result Status as of January 19, 2010:

M.L. 2009: NRCS addressed 30,000 acres in Crow Wing County, 60,000 acres in Lake County and 5,000 acres in Cook County. NRCS has provided 2 soil scientists to address Lake County and 1 fulltime and 1 part time soil scientist to address Cook County.

Result Status as of July 13, 2010:

M.L. 2009: Contracts have been completed with Cook and Lake Counties who have employed four soil scientists working under the direction of NRCS. Activities continue in Crow Wing County. BWSR has not received invoices for work done on these contracts.

Result Status as of December 30, 2010:

M.L. 2009: Four contracted soil scientists, with aid from NRCS detailees (Result 2), addressed 66,000 acres in Lake County, 13,000 acres in Crow Wing County, and 38,000 acres in Cook County.

Final Report Summary

M.L. 2008: The NRCS addressed 71,000 acres in Crow Wing County and 32,000 in Pine County (despite Pine County’s withdrawal from the program). Portions of both Crow Wing and Pine Counties are available on the Web Soil Survey.

Result 2: “Increase soil mapping. Experience has shown that soil mapping can be accelerated by augmenting existing NRCS staff with experienced soil scientists familiar with NRCS mapping procedures and the soil landscape. For 2008, an additional 40,000 acres will be addressed by current NRCS soil scientists (detailees) brought to Minnesota on work assignments. For 2009, an additional 28,000 acres will be addressed. **Amendment approved: 6/24/2010**

Summary Budget Information for Result 2:

	M.L. 2008	M.L. 2009	Total
Trust Fund Budget:	\$100,000	\$140,000	\$240,000
Amount Spent:	\$100,000	\$0	\$100,000
Balance:	\$0	\$140,000	\$240,000

Deliverable	Completion Date	Budget	General Status (See details below)
1. M.L. 2008: 40,000 acres addressed in several project areas including Pine, Saint Louis (Crane Lake) Lake, Cook and Koochiching. This deliverable will be completed by June 30, 2010. (Note: “New” surveys -Lake and Cook- received only federal funds.) Pine terminated the project July 7, 2009; funds, if any, to shift to NRCS in 2009.	June 30, 2010	\$100,000	Acreage goals were met and budgeted amount was spent.
2. M.L. 2009: 28,000 acres addressed in several project areas including Saint Louis (Crane Lake), Koochiching, Lake and Cook Counties. Decreased acreage goal by NRCS due to increased acreage by private sector soil scientists working	June 30, 2011	\$140,000	A contract with NRCS is complete and NRCS

<p>under NRCS direction. This deliverable will be completed by June 30, 2011. Amendment approved: 6/24/2010</p>		<p>relocated existing soil scientists in MN to accelerate mapping.</p>
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Result Status as of August 20, 2009:

M.L. 2009: A plan for acceleration is being developed based on an assessment of 2008 activities.

Result Status as of January 19, 2010:

M.L. 2009: A plan for accelerating production in Lake and Cook Counties is being discussed and may include detailees, private sector soil scientists and new technology such as soil inference modeling techniques.

Result Status as of July 13, 2010:

M.L. 2009: NRCS is advertising for detailees, who will complement the existing work force in Lake, Cook and Crow Wing Counties.

Result Status as of December 30, 2010:

M.L. 2009: NRCS relocated 2 detailees to work on mapping in Northeast Minnesota. The increased ‘man power’ accelerated mapping in Lake, Cook and St. Louis Counties. About 20,000 acres were address in the Crane Lake Subsection of St. Louis County. The NRCS detailees and contracted soil scientists addressed 66,000 acres in Lake County, 13,000 acres in Crow Wing County and 38,000 acres in Cook County.

Final Report Summary

M.L. 2008: NRCS-employed soil scientists, assigned to Minnesota (“detailees”), addressed 85,000 acres in Koochiching County and 80,000 acres in the Crane Lake subset of Saint Louis County. As a result of these significant accomplishments, the surveys of Koochiching and the Crane Lake subset were completed one year ahead of schedule and will be posted on the WEB Soil Survey. Lake and Cook Counties received only Federal funds and the ‘new’ soil surveys are prioritized for mapping with 2009 Soil Survey Project appropriation.

Result 3: “Accelerate data collection, availability and interpretation.”

By providing additional personnel (including professional/technical contracts) to update and interpret soils data, modern interpretations will be developed, some from older data. All data will be available for delivery on the Internet (Web Soil Survey). The USDA

NRCS has committed \$8,000 cash and an equal amount of in-kind services to this effort. **Amendment approved 6/24/2010**

Summary Budget Information for Result 3:

	M.L. 2008	M.L. 2009	Total
Trust Fund Budget:	\$150,000	\$25,000	\$175,000
Amount Spent:	\$150,000	\$0	\$150,000
Balance:	\$0	\$25,000	\$25,000

Deliverable	Completion Date	Budget	Status
1. M.L. 2008: A county-based soil productivity index for agricultural crops and forests will be developed for statewide use by June 1, 2009. This project will be done in consultation with the NRCS who is responsible for posting the product on the WEB Soil Survey.	June 1, 2009	No 2008 funds were used for this deliverable. 2007 funds were used.	Crop productivity and forest productivity indices have been prepared for 85 and 20 soil survey areas, respectively.
2. M.L.2008 and M.L. 2009: Data from several hundred lab samples dating back to the 1970's will be interpreted and made Web-available. Amendment approved 6/24/2010	June 30, 2011	\$175,000 (150,000 '08 and 25,000 '09)	The UM-led '08 project is nearing completion and additional samples will be characterized with '09 funding. A report is available in January 2011.

Result Completion Date: M.L. 2008: Deliverables 1 and 2 will be done by June 1, 2009 and June 30, 2011, respectively. For budget purposes, the budget for the entire Result is allocated among all deliverables.

Result Status as of March 11, 2009: Deliverable 1. (Soil productivity indices) are mostly done (funded with 2007 LCCMR appropriations) so attention has been given to the interpretation of historic data (deliverable 2). To that end, the UM has been working with USDA NRCS staff on database matters and will likely hire student workers to do the majority of data entry.

Result Status as of July 13, 2010

M.L. 2009: A retired NRCS soil scientist was hired to do interpretation of additional historic soil samples. These interpretations will augment existing data in the national NRCS soils data base. As of July 13, 2010, BWSR has not received an invoice for work done on this contract.

Result Status as of December 30, 2010

M.L. 2008: The \$150,000 has been spent from the 2008 appropriation of funds for Result 3, deliverable 2. A report on analysis of historic lab samples compared to contemporary samples will be available in January 2011.

M.L. 2009: The retired NRCS soil scientist has completed interpretation of additional historic soil samples. Work is currently focused on integrating new data into the national soils database. As of December, 2010, BWSR has not received an invoice for work done on this contract.

Final Report Summary

M.L. 2008: Inventorying and cataloging the over 10,000 soil samples collected over a 30 year period beginning in the mid-1970's has begun. Using many of these same sampling sites, contemporary samples will be taken to determine what, if any, trends exist regarding soil carbon and nitrogen. Data for 118 sites has been collected and is being interpreted. A paper detailing the results will be ready by January 2011. Initial results show land use and management influence soil organic carbon levels in Minnesota soils.

VII. Total Trust Fund Project Budget:

M.L. 2008

Staff or Contract Services: \$ 400,000. \$150,000 --\$75,000 each for contracts with Crow Wing and Pine Counties—for ongoing soil survey activities. Due to their withdrawal, Pine County will receive a pro-rated final payment and may not earn the entire \$75,000 [result 1]; \$100,000 contract with USDA-NRCS to increase soil mapping and data availability [result 2] The balance—if any-- of the Pine County agreement will be awarded to USDA-NRCS; \$150,000 contract with the UM to accelerate data collection, availability and interpretation [result 3].

Equipment: \$ None anticipated to be procured with LCCMR funds.

Development: \$ N/A

Restoration: \$ N/A

Acquisition, including easements: \$ N/A

TOTAL 2008 TRUST FUND PROJECT BUDGET: \$ 400,000

M.L. 2009

Contracts: \$400,000 USDA NRCS \$140,000; Counties \$235,000: Crow Wing County \$75,000; Lake County \$107,000; and Cook County, \$53,000; Retired NRCS soil scientist, \$25,000.

Equipment/Tools/Supplies: N/A

Acquisition, including Easements: N/A

Travel: N/A

Other: N/A

TOTAL 2009 TRUST FUND PROJECT BUDGET: \$400,000

IIX. OTHER FUNDS & PARTNERS/ PROJECT STRATEGY:

A. Project Partners:

M.L. 2008

The project team includes Joe McCloskey, State Soil Scientist, USDA NRCS; Greg Larson, State Soil Specialist, BWSR, and Professor Ed Nater, UM Department of Soil, Water and Climate. The NRCS will receive \$100,000 plus the balance of the terminated agreement with Pine County and the UM will receive \$150,000.

M.L. 2009 Amendment Approved: 5/7/2010

The project team includes Caryl Radatz, State Soil Scientist, USDA NRCS; Megan Lennon, Soil Scientist, BWSR and Greg Larson, State Soil Specialist. The NRCS will receive \$140,000.

B. Other Funds Proposed to be Spent during 2008 and 2009:

Each year, the Minnesota Office of the NRCS has or will commit(s) about \$2.5 Million to their soils program, with about \$2.0 Million spent on completing soil mapping and digitizing activities in the remaining project areas. The Board of Water and Soil Resources provides in-kind contributions of about \$20,000 annually.

C. Spending History:

The LCMR contributed \$500,000 funding for the biennium ending June 30, 2007. Crow Wing County has contributed about \$30,000 annually. Pine County has contributed about \$10,000 annually. Lake and Cook Counties will each contribute about \$10,000 annually.

D. Time for 2008 and 2009 funds:

2008 funds are for the biennium beginning July 1, 2008.

2009 funds are for the biennium beginning July 1, 2009.

E. Project Impact and Long-term Strategy:

As stated previously, soils data are critical to the use and management of soils and other natural resources. Work remains in five survey areas (of 91) before WEB-

published soil survey is available statewide. A county by county assessment of the completion schedule is provided, followed by a table that summarizes which year(s) of LCCMR funding was used.

Koochiching: Field work is done. WEB-publication is complete.

Saint Louis County (Crane Lake subset): Field work is done. WEB-publication is complete.

Pine: Work is no longer on schedule. The termination of the project by the county creates an uncertain future. To meet federal mandates, USDA-NRCS will continue to work in the county but at a much slower pace. However, as reported earlier, the NRCS has made significant progress.

Crow Wing County: Work is on schedule to complete the entire county by late 2013. WEB-publication of the 83,000 acre Glacial Lake Brainerd geomorphic area is complete.

Lake County: As reported earlier, work is beginning to complete the entire county by late 2013. Much of the county is part of the Superior National Forest. Soils mapping therein has been completed by the US Forest Service.

Cook County: As reported earlier, work is beginning to complete the entire county by late 2013. Much of the county is part of the Superior National Forest. Soils mapping therein has been completed by the US Forest Service.

Survey Area	LCCMR 07	LCCMR 08	LCCMR 09
Koochiching	X	X	
Saint Louis (Crane Lake)	X	X	
Pine County		X	
Crow Wing County	X	X	X
Lake County			X
Cook County			X

IX. DISSEMINATION: As the projects described herein are developed and approved by the NRCS, they may be used without restriction.

IX. REPORTING REQUIREMENTS: Periodic work program progress reports will be submitted not later than January 2009; June 30, 2009; January 2010, June 30, 2010, and January 2011. A final work program report and associated products for the 2008 appropriation will be submitted between June 30 and August 1, 2010 as requested by the LCCMR and a final work program report and associated

products for the 2009 appropriation will be submitted no later than August 1, 2011.

X. RESEARCH PROJECTS: Not applicable.

Attachment A: Budget Detail for 2009 Projects July 11, 2010											
Project Title: Soil Survey											
Project Manager Name: Greg Larson											
Trust Fund Appropriation: \$400,000											
2009 Trust Fund Budget	Results 1 Budget 4/15/2010 Amendment approved: 5/7/2010	Amount Spent (11/16/2010)	Balance (12/30/2010)	Revised Result 2 Budget July 11, 2010	Amount Spent (10/21/2010)	Balance (12/30/2010)	Revised Result 3 Budget 7/11/2010	Amount Spent (12/30/2010)	Balance (12/30/2010)	Revised TOTAL Budget BUDGET	Revised TOTAL BALANCE
				Increase soil mapping							
BUDGET ITEM											
Contracts											
Cook County	53,000	53,000	0							53,000	0
Crow Wing County	75,000	0	75,000							75,000	75,000
Lake County	107,000	41,395	65,605							107,000	65,605
Retired Soil Scientist 6/24/2010 (Al Giencke, work is to interpet and make web available 1,000 soil samples)							25,000	0	25,000	25,000	25,000
USDA NRCS				140,000	50,000	90,000		0		140,000	90
COLUMN TOTAL	\$235,000	\$94,395	\$140,605	\$140,000	\$0	\$140,000	\$25,000	\$0	\$25,000	\$400,000	\$165,695

