

2008 and 2009 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 two-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: (a) 330,000 acres mapped in Crow Wing County; (b) 32,000 acres mapped in Pine County; (c) 85,000 acres mapped in Koochiching County; (d) 80,000 acres mapped in the Crane Lake subset of St. Louis County; (e) 219,000 acres mapped in Lake County; (f) 114,000 acres mapped in Cook County; (g) 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; (h) Land use effects on soil carbon were determined on 122 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, Lake, Cook 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 land use impacts on soil carbon is available on [BWSR's State Soil Office website](#).

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.

Environment and Natural Resources Trust Fund 2009 Work Program Final Report

Date of Report: August 15, 2011
Final Report

	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, Koochiching, Lake, Cook and Saint Louis Counties. 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	\$393,693.50	\$793,693.50
Equal Balance:	\$0	\$6,306.50	\$6,306.50

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 and 2009 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.

In the ongoing, multi-year project to map, classify, interpret and Web-publish an inventory of the soils of Minnesota, this two-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: (a) 330,000 acres mapped in Crow Wing County; (b) 32,000 acres mapped in Pine County; (c) 85,000 acres mapped in Koochiching County; (d) 80,000 acres mapped in the Crane Lake subset of St. Louis County; (e) 219,000 acres mapped in Lake County; (f) 114,000 acres mapped in Cook County; (g) 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; (h) Land use effects on soil carbon were determined on 122 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, Lake, Cook 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 land use impacts on soil carbon is available on [BWSR's State Soil Office website](#).

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IV. 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	\$228,693.50	\$378,693.50
Balance:	\$ 0	\$6,306.50	\$6306.50

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	About 263,000 acres were addressed with ENTRF

			LCCMR funds and NRCS cost-share. The entire budget was spent.
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	About 76,000 acres were addressed. \$100,776.50 spent was spent.
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	June 30, 2011	\$53,000	About 42,000 acres were addressed. \$52,917 was spent.

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.

M.L. 2009: The NRCS and its contract soil mappers exceeding mapping goals. A total of 390,000 acres were mapped in Crow Wing, Lake and Cook Counties. The Glacial Lake Brainerd region of Crow Wing County (83,000 acres) is available on Web Soil Survey. Crow Wing, Lake and Cook Counties contributed \$30,000, \$10,000 of in-kind services annually to the soil survey effort. The Lake County survey effort came in under budget by \$6,223.50 due to an initial over estimate of work load (mapping acreage) for contract soil mappers. By the time this was discovered it was too late in the fiscal year to amend the work plan and shift funds to another Result. After mapping approximately 42,000 acres in Cook County, \$83 remained unspent.

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	\$140,000	\$240,000
Balance:	\$0	\$0	\$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 under NRCS direction. This deliverable will be completed by June 30, 2011. Amendment approved: 6/24/2010	June 30, 2011	\$140,000	Acreage goals were exceeded with 215,000 acres addressed with ENTRF LCCMR funds and NRCS cost-share. The budget was spent.

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.

M.L. 2009: NRCS soil scientists exceeded acreage goals and mapped 226,000 acres in Lake, St. Louis and Cook Counties. Soils data for Koochiching County and St. Louis County is available on Web Soil Survey. NRCS matched \$2,000,000 to complete soil mapping and digitizing in remaining project areas.

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	\$25,000	175,000
Balance:	\$0	\$0	\$0

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.	June 30, 2011	\$175,000 (150,000 '08 and 25,000 '09)	1,000 soil pedon samples were

Amendment approved 6/24/2010			evaluated and entered into Web Soil Survey. The entire budget was spent.
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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 122 sites has been collected and is being interpreted. A report detailing the results is available on the [BWSR State Soils Office](#) webpage. Results show long-term land use and management influence soil organic carbon levels in Minnesota soils.

M.L. 2009: A retired NRCS soil scientist completed interpretation, correlation and reclassification of 1,000 previously untested soil samples from the 1970's. The new data was entered into the National Soil Survey database and is available on [Web Soil Survey](#).

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: Final Budget Detail for 2009 Project											
Project Title: Soil Survey											
Project Manager Name: Megan Lennon											
Trust Fund Appropriation: \$400,000											
2009 Trust Fund Budget	Results 1 Budget 4/15/2010 Amendment approved: 5/7/2010	Amount Spent (6/30/2011)	Balance (6/30/2011)	Revised Result 2 Budget July 11, 2010	Amount Spent (6/30/2011)	Balance (6/30/2011)	Revised Result 3 Budget 7/11/2010	Amount Spent (6/30/2011)	Balance (6/30/2011)	Revised TOTAL Budget BUDGET	Revised TOTAL BALANCE
	<i>Support county government efforts to complete the soil survey</i>			<i>Increase soil mapping</i>			<i>Accelerate data collection, availability and interpretation</i>				
BUDGET ITEM											
Contracts											
Cook County	53,000	52,917	83							53,000	0
Crow Wing County	75,000	75,000	0							75,000	0
Lake County	107,000	100,776.50	6,223.50							107,000	6,223.50
Retired Soil Scientist 6/24/2010 (Al Giencke, work is to interpet and make web available 1,000 soil samples)							25,000	25,000	0	25,000	0
USDA NRCS				140,000	140,000	0		0		140,000	0
COLUMN TOTAL	\$235,000	\$228,693.50	\$6,306.50	\$140,000	\$140,000	\$0	\$25,000	\$25,000	\$0	\$400,000	\$6,306.50