2007 Project Abstract
For the Period Ending June 30, 2009

PROJECT TITLE: Soil Survey
PROJECT MANAGER: Greg Larson
AFFILIATION: Board of Water and Soil Resources
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FUNDING SOURCE: Environment and Natural Resources Trust Fund
LEGAL CITATION: ML 2007, [Chapter 30], [Sec.2], Subd.6 (b).

APPROPRIATION AMOUNT: $ 400,000

Overall Project Outcome and Results
In the ongoing multi-year process 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 soil mapping, developing new soil interpretations and developing linkages of soils data with other related natural resources data. Specifically:

- 165,000 acres were addressed in Crow Wing County resulting in a digital soil survey for a portion of Crow Wing County, the Glacial Lake Brainerd area, to be released in the fall of 2009;
- 80,000 acres were addressed by NRCS soil scientists in Koochiching and Saint Louis Counties, resulting in soil mapping for Koochiching County being completed one year ahead of schedule;
- Soil productivity indices for cropland and forests were developed for 84 and 19 counties, respectively, in order to replace the outmoded Crop Equivalent Ratings (CER);
- Web-based decision support system was developed that integrates soils data with other natural resources data;
- Support was provided for the University of Minnesota Land Economics website to better complement USDA Web Soil Survey interpretations;
- Six counties (Cass, Carlton, St. Louis-Duluth subset, Lincoln, Scott and Benton) were digitized and posted on the Web Soil Survey bringing the total to 81 survey areas.

Two key lessons were learned during this 2007 phase that were incorporated into the on-going 2008 and 2009 project. The use of current NRCS employees brought to Minnesota on a work assignment ("detailees") is an efficient way to increase the completion of soil surveys after the initial investigative phase has been completed and a mapping legend has been developed. Additionally, we have determined that the USDA Web Soil Survey system is effective and sufficient for Web-publishing of Minnesota' soil survey data, so an independent system does not need to be developed by the state.

Project Results Use and Dissemination
Digital data through the WEB Soil Survey http://websoilsurvey.nrcs.usda.gov are available for 83 project areas (Two additional survey areas have been completed with 2008 funds). Soil interpretations such as soil erosion and forest productivity indices are available at the University of Minnesota Land Economics Website http://www.landeconomics.umn.edu Soils data for areas not yet mapped and digitized are available to the public on a request basis.

Trust Fund 2007 Work Program Final Report

Date of Report: August 14, 2009
"Trust Fund 2007 Work Program Final Report"
Date of Work Program Approval: June 5, 2007
Project Completion Date: June 30, 2009

I. PROJECT TITLE: Soil Survey

Project Manager: Greg Larson **Affiliation:**
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Location: Crow Wing and four or more additional Counties. Web-based delivery has statewide applicability.

Total Biennial LCMR Project Budget:	**LCMR Appropriation:**	**$400,000**
	Minus Amount Spent:	**$400,000**
	Equals Balance:	**$ 0**

Legal Citation: ML 2007, [Chap. 30], [Sec. 2], Subd.6 (b).

Appropriation Language: $400,000 is from the trust fund to the Board of Water and Soil Resources to accelerate the completion of soil survey mapping and Web-based delivery in five or more counties. The new soil surveys must be done on a cost-share basis with local and federal funds.

II. and III. FINAL PROJECT SUMMARY:

In the ongoing multi-year process 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 soil mapping, developing new soil interpretations and developing linkages of soils data with other related natural resources data. Specifically:

- 165,000 acres were addressed in Crow Wing County resulting in a digital soil survey for a portion of Crow Wing County, the Glacial Lake Brainerd area, to be released in the fall of 2009;
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- Soil productivity indices for cropland and forests were developed for 84 and 19 counties, respectively, in order to replace the outmoded Crop Equivalent Ratings (CER);

- Web-based decision support system was developed that integrates soils data with other natural resources data;
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- Six counties (Cass, Carlton, St. Louis-Duluth subset, Lincoln, Scott and Benton) were digitized and posted on the Web Soil Survey bringing the total to 81 survey areas.

Two key lessons were learned during this 2007 phase that were incorporated into the on-going 2008 and 2009 project. The use of current NRCS employees brought to Minnesota on a work assignment ("detailees") is an efficient way to increase the completion of soil surveys after the initial investigative phase has been completed and a mapping legend has been developed. Additionally, we have determined that the USDA Web Soil Survey system is effective and sufficient for Web-publishing of Minnesota' soil survey data, so an independent system does not need to be developed by the state.

IV. OUTLINE OF PROJECT RESULTS:

Soil surveys contain information essential to the management of natural resources.Farmers, foresters and other land managers must consider soil properties in the planning and application of their management systems. 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. Soils data is now readily available through the Internet. Progress was made with this project to accelerate the expansion of WEB-based soils data. This project supported the acceleration of soil survey data by making timely use of former and current NRCS soil scientists. Funds were also used to develop and promote the use of soil mapping technology, and explore ways to make the WEB Soil Survey more "GIS-friendly".

Result 1: Maintain current level of support to the Crow Wing County Soil Survey. Crow Wing County comprises about 740,000 acres. The NRCS estimates completion to take about 8 years. State support of this survey generated about $45,000 of local cash support and additional in-kind contributions in the form of office space and soil survey related equipment.

Summary Budget Information for Result 1: Trust Fund Budget: $75,000

Amount Spent: $75,000

Balance: $ 0

Final Report Summary: The NRCS addressed about 165,000 acres**.** Significant to this project is the anticipated WEB publication and fall 2009 release of soils data for the Glacial Lake Brainerd area. Rather than wait until an entire county has been completed as has been past practice, early availability of products will aid land users in this lake-rich area of Crow Wing County.

Result 2: Increase soil mapping and interpretation in Crow Wing and four additional counties. Soil mapping and interpretation was accelerated by augmenting existing NRCS staff

with experienced soil scientists familiar with NRCS mapping procedures and the soil landscape and by providing technical and other support to on-going soil surveys. An additional 100,000 acres were anticipated to be mapped by using recently retired NRCS soil scientists, current NRCS soil scientists brought to Minnesota on work assignments and by providing support to field data collection, interpretation of data, and subsurface investigations.

Summary Budget Information for Result 2: Trust Fund Budget: $175,000

Amount Spent: $175,000

Balance: $ 0

Final Report Summary: Five NRCS soil scientists detailed to Minnesota addressed about 80,000 acres in Koochiching and Saint Louis Counties. Detailees demonstrated their ability to meet production goals ensuring their continued use in the accelerated completion of soil surveys. The success of using detailees for production resulted in the completion of soil mapping in Koochiching County about 12 months ahead of schedule. Funding was provided to soil and water conservation districts for backhoe services to aid project soil scientists in developing soil interpretations. This effort was particularly useful in Crow Wing County and contributed to the success reported in Result 1. The University of Minnesota assisted in providing soil survey interpretations and WEB support to the crop and soil productivity indices addressed in Result 3.

Result 3: Accelerate existing NRCS field activities, training, digitizing, data entry and correlation. Additional personnel and funding was provided to the NRCS and an additional 30,000 acres were addressed in the counties mentioned in result 2. Other counties deemed a priority by the NRCS for improving the soil data base, and training of personnel, were accelerated and Benton County was completed one year ahead of schedule. As a condition to NRCS participation in the completion of Lake and Cook counties, county funding was required. Lake and Cook Counties did not provide local funding so activities did not commence.

Summary Budget Information for Result 3: Trust Fund Budget: $75,000

Amount Spent: $75,000

Balance: $ 0

Final Report Summary: Funding for this result was spent by August 2008. Since then, refinement of the crop and forest productivity indices has been ongoing, and in concert with Results 2 and 4, enhancements were made to the Minnesota Land Economics Website incorporating soil productivity indices and soil erosion potential ratings. Agricultural soil productivity indices were completed for 84 soil survey areas (all or part of 81 counties) and forestry productivity indices were completed for 19 northern counties. Based on the number of hits on the WEB Soil Survey Website, these data are popular. Interest in driven in part by the increase in row crop production and the demise of the popular CER (Crop Equivalent Ratings), an assessment and soil management guide developed by the University of Minnesota in the 1970's. Crop and soil productivity indices have officially replaced Crop Equivalent Ratings.

Result 4: Increased technology and utility of data. Soil mapping technology became more readily available, including methods that use high resolution landscape mapping. The University of Minnesota and the Board of Water and Soil Resources developed enhancements to the WEB Soil Survey to make it more "GIS-friendly", and, consequently, make soils data easier to use as a "layer" in GIS applications.

Summary Budget Information for Result 4: Trust Fund Budget: $75,000

Amount Spent: $75,000

Balance: $0

Final Report Summary: A WEB-based soil driven decision support system for natural resources called NRDS (Natural Resource Decision Support System) is fully functional and applications of it are in planning for use in BWSR natural resource grant applications submitted by local units of government. At the time of its completion, NRDS functionality far exceeded the WEB Soil Survey. Since, then, however, the WEB Soil Survey has been updated negating many of the advantages of NRDS.

V. Total Trust Fund Project Budget:

Staff or Contract Services: $400,000

Of this amount, two $75,000 contracts were written, one to Crow Wing County [Result 1] and the other to the University of Minnesota [Result 4]. $250,000 was allocated in Results 2 and 3 as follows: Retired NRCS employees hired through the University of Minnesota ($120,000); Contracts with SWCDs for backhoe services ($30,000) and a contract with NRCS for detailees ($100,000). One retired NRCS employee served as lead employee and oversaw Results 2 and 3.

Equipment: $ 0

Development: $0

Restoration: $0

Acquisition, including easements: $0

Total Trust Fund Project Budget: $400,000 (see Attachment A)

VI. OTHER FUNDS & PARTNERS:

A. Project Partners:

The project team included Joe McCloskey, State Soil Scientist, USDA NRCS; Greg Larson, State Soil Specialist, BWSR and Professor Ed Nater, UM Department of Soil, Water and Climate.

B. Other Funds Proposed to be Spent during the Project Period:

Of the $2.5 Million annual commitment of the Minnesota Office of the NRCS to their soils program, about $1.3 Million was spent on completing soil mapping and digitizing activities in the remaining 14 counties. Crow Wing County contributed about $45,000 cash and additional in-kind contributions. The Board of Water and Soil Resources contributed in-kind contributions of about $20,000.

C. Past Spending:

Soil mapping and digitizing received $400,000 of LCMR funding for the biennium ending June 30, 2007. During this period, Crow Wing County contributed about $30,000 cash and in-kind contributions of $15,000.

D. Time:

Results 1 through 3 are part of a multi-county on-going effort to complete soil mapping and digitizing. This phase of the ongoing project was completed on schedule and transitioned into the 2008 project. Result 4, a free standing effort, was also completed by June 30, 2009.

VII. DISSEMINATION: As the projects described herein were developed and approved they were marked “advanced copy” and were distributed by the NRCS and project partners without restriction. The final products were digital and WEB-based.

VIII. REPORTING REQUIREMENTS: Periodic work program progress reports were submitted January 11, 2008; November 25, 2008 and February 25, 2009. A final work program report and associated products was submitted August 14, 2009.

IX. RESEARCH PROJECTS: Not applicable.

Attachment A: Final Budget Detail for 2007 Projects 14-Aug-09

Project Title: Soil Survey

Project Manager Name: Greg Larson

Trust Fund Appropriation: $ *400,000*

2007 Trust Fund Budget	**Result 1 Budget:**	**Amount Spent**	**Balance** *(06/30/09)*	**Result 2 Budget**	**Amount Spent**	**Balance** *(06/30/09)*	**Result 3 Budget**	**Amount Spent**	**Balance** *(06/30/09)*	**Result 4 Budget**	**Amount Spent**	**Balance** (06/30/09)	**TOTAL BUDGET**	**BALANCE**
	Maintain current level of support to the Crow Wing County Soil Survey.			*Increase soil mapping and interpretation in Crow Wing and four additional counties*			*Accelerate existing NRCS field activities, training, digitizing, data entry and correlation*			*Increased technology and utility of data*				
BUDGET ITEM														
Contracts														
NRCS soil scientists detailees				100,000	100,000	0							100,000	0
Crow Wing County	75,000	75,000	0										75,000	0
University of Minnesota				45,000	45,000	0	75,000	75,000	0	75,000	75,000	0	195,000	0
													0	0
													0	0
Soil&Water Conservation Districts				30,000	30,000	0							30,000	0
													0	0
COLUMN TOTAL	**$75,000**	**$75,000**	**$0**	**$175,000**	**$175,000**	**$0**	**$75,000**	**$75,000**	**$0**	**$75,000**	**$75,000**	**$0**	**$400,000**	**$0**