

2011 Project Abstract

For the Period Ending June 30, 2014

PROJECT TITLE: Completion of Statewide Digital Soil Survey

PROJECT MANAGER: Megan Lennon

AFFILIATION: Board of Water and Soil Resources

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FUNDING SOURCE: Environment and Natural Resources Trust Fund

LEGAL CITATION: M.L. 2011, First Special Session, Chp. 2, Art.3, Sec. 2, Subd. 03c

APPROPRIATION AMOUNT: \$

Overall Project Outcome and Results

This project, Completion of Statewide Digital Soil Survey, is the last in a series of proposals to map and digitize all Minnesota soils. The Environment and Natural Resources Trust Fund (ENRTF) supported the completion of a statewide soil survey since 1997. ENRTF's contribution of \$3.5 million over 17 years leveraged \$13.2 million from project partners including cooperating counties, the Natural Resource Conservation Service (NRCS), and the University of Minnesota. Soil surveys contain information essential to the management of natural resources. Soil surveys provide a field-based scientific inventory of soil resources, including soil maps, data about the physical and chemical properties of soils, and information on the potentials and limitations of each soil. Farmers, landowners, builders, county assessors, and natural resource managers depend on soil survey information to conduct business and protect natural resources. This project extended soil maps and data to millions of acres previously lacking comprehensive soil surveys.

It is ideal to have 'seamless' soil data coverage regardless of land ownership (county, state, federal, or private). However, gaps exist in soil survey coverage due to these land ownership issues. This project focuses on addressing portions of Minnesota with missing digital soils information; e.g., the Boundary Waters Canoe Area Wilderness, the Superior National Forest, and Crow Wing County. At the end of the final mapping phase (NRCS contributions extend to 2016) Pine County and the Grand Portage Reservation will be the only unmapped areas in Minnesota. NRCS intends to map Pine County in the future, funded entirely by the NRCS.

The mapping goal for the ENRTF funds was 400,000 acres. NRCS mapped over 2 million acres using ENRTF dollars and Federal funds.

Mapping totals for this project:

Soil Survey Area	Acreage
Crow Wing County	207,546
Lake and Cook Counties (outside Superior National Forest boundary)	470,000
Lake, Cook and St. Louis Counties (inside Superior National Forest boundary)	793,725
Boundary Waters Canoe Area Wilderness	600,000
Grand Total	2,071,271

All the spatial and tabular data collected during this project will be available on Web Soil Survey.
www.websoilsurvey.sc.egov.usda.gov

Project Results Use and Dissemination

The data collected during the soil survey field investigations is available to the public via the Web Soil Survey website. www.websoilsurvey.sc.egov.usda.gov The Web Soil Survey is the single authoritative source of up-to-date soils information for selecting sites for development, road building, pipeline corridors, and waste disposal; for pollution control; for minimizing risks to human life and property; and for wildlife management, wetlands identification, and soil or water conservation. The data collected during this project will be posted to Web Soil Survey in January 2015.



Environment and Natural Resources Trust Fund (ENRTF) M.L. 2011 Work Plan Main Document Final Report

Date of Status Update: 8/15/2014
Date of Next Status Update: Final Report
Date of Work Plan Approval: 6/23/2011
Project Completion Date: 6/30/2014 **Is this an amendment request?** _No_

Project Title: Completion of Statewide Digital Soil Survey

Project Manager: Megan Lennon

Affiliation: Board of Water and Soil Resources

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City: St Paul **State:** MN **Zipcode:** 55155

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Location:

Counties Impacted: Statewide

Ecological Section Impacted: Lake Agassiz Aspen Parklands (223N), Minnesota and Northeast Iowa Morainal (222M), North Central Glaciated Plains (251B), Northern Minnesota and Ontario Peatlands (212M), Northern Minnesota Drift and lake Plains (212N), Northern Superior Uplands (212L), Paleozoic Plateau (222L), Red River Valley (251A), Southern Superior Uplands (212J), Western Superior Uplands (212K)

Total ENRTF Project Budget:	ENRTF Appropriation \$:	500,000
	Amount Spent \$:	500,000
	Balance \$:	0

Legal Citation: M.L. 2011, First Special Session, Chp. 2, Art.3, Sec. 2, Subd. 03c

Appropriation Language:

\$250,000 the first year and \$250,000 the second year are from the trust fund to the Board of Water and Soil Resources to accelerate the completion of county soil survey mapping and Web-based data delivery. The soil surveys must be done on a cost-share basis with local and federal funds.

I. PROJECT TITLE: Completion of a Statewide Digital Soil Survey

II. FINAL PROJECT SUMMARY:

This project, Completion of Statewide Digital Soil Survey, is the last in a series of proposals to map and digitize all Minnesota soils. The Environment and Natural Resources Trust Fund (ENRTF) supported the completion of a statewide soil survey since 1997. ENRTF's contribution of \$3.5 million over 17 years leveraged \$13.2 million from project partners including cooperating counties, the Natural Resource Conservation Service (NRCS), and the University of Minnesota.

Soil surveys contain information essential to the management of natural resources. Soil surveys provide a field-based scientific inventory of soil resources, including soil maps, data about the physical and chemical properties of soils, and information on the potentials and limitations of each soil. Farmers, landowners, builders, county assessors, and natural resource managers depend on soil survey information to conduct business and protect natural resources. This project extended soil maps and data to millions of acres previously lacking comprehensive soil surveys.

It is ideal to have 'seamless' soil data coverage regardless of land ownership (county, state, federal, or private). However, gaps exist in soil survey coverage due to these land ownership issues. This project focuses on addressing portions of Minnesota with missing digital soils information; e.g., the Boundary Waters Canoe Area Wilderness, the Superior National Forest, and Crow Wing County. At the end of the final mapping phase (NRCS contributions extend to 2016) Pine County and the Grand Portage Reservation will be the only unmapped areas in Minnesota. NRCS intends to map Pine County in the future, funded entirely by the NRCS.

The mapping goal for the ENRTF funds was 400,000 acres. NRCS mapped over 2 million acres using ENRTF dollars and Federal funds.

Mapping totals for this project:

<i>Soil Survey Area</i>	<i>Acreage</i>
<i>Crow Wing County</i>	<i>207,546</i>
<i>Lake and Cook Counties (outside Superior National Forest boundary)</i>	<i>470,000</i>
<i>Lake, Cook and St. Louis Counties (inside Superior National Forest boundary)</i>	<i>793,725</i>
<i>Boundary Waters Canoe Area Wilderness</i>	<i>600,000</i>
Grand Total	2,071,271

All the spatial and tabular data collected during this project will be available on Web Soil Survey. www.websoilsurvey.sc.egov.usda.gov

III. PROJECT STATUS UPDATES:

Project Status as of January 2012: This project is on schedule. For Result 1, since July 1, 2011, 47,238 acres have been addressed in Crow Wing County. For Result 2, 91,000 acres have been addressed since July 1, 2011, mostly in Lake and Cook counties. Further, another part of Crow Wing County totaling 95,000 acres will be posted on the Web Soil Survey by July 2012.

Project Status as of September 2012: The mapping portion of the project is on schedule. A total of 279,000 acres were mapped in Crow Wing, Lake, Cook and St. Louis Counties since the last status update in January 2012. An additional 80,000 acres of Superior National Forest land was recorrelated to NRCS Data Map Units from United States Forest Service Ecological Land Type phases. Field work and soil mapping continues through fall 2012. Online posting of partial data sets was delayed because the soils database and Web Soil Survey software is undergoing upgrades. The National NRCS invoicing system also underwent upgrades and delayed generation of invoices for work performed in the summer of 2012. BWSR has not yet been invoiced for the work summarized in this work plan update.

Amendment Request (06/18/2013): Due to the unforeseen circumstances of the 2011 Minnesota Government shutdown, the 15% Federal budget cut affecting NRCS, and invoicing complications due to the new Federal contract management system, the NRCS needs additional time to complete the soil mapping goals in Activities 1 and 2. This amendment requests an additional year to complete all activities. This amendment does not shift funding between categories or activities.

Amendment Approved: 06/26/2013

Project Status as of November 2013: Field work in Crow Wing County is complete. Digitizing and quality control is ongoing with posting of the remainder of the County on WEB Soil Survey scheduled for June 2014. All private land outside the USFS boundary in Cook and Lake Counties—470,000 acres—has been completed with posting on WEB Soil Survey scheduled for November 2013. An agreement has been reached with the National Park Service to develop a digital soil map for Voyageurs National Park. Correlation of USFS mapping to NRCS conventions continues.

Project Status as of March 2014: Digitizing in Crow Wing County is nearly complete and posting to Web Soil Survey was extended to September 2014 due to staff reductions at NRCS. Superior National Forest mapping proceeds quickly by utilizing the National Forest Services ecological land type phases that are correlated to NRCS mapping units. Over 530,000 additional acres were mapped.

IV. PROJECT ACTIVITIES AND OUTCOMES:

ACTIVITY 1: Support Crow Wing County effort with UDSA NRCS

Description:

Complete mapping, interpretations, documentation and digitizing soil survey data. A total of 340,000 acres will be addressed in Crow Wing County. ENRTF funds will be used to address 60,000 acres and the remaining acreage will be addressed with NRCS funds. Mapping Crow Wing County will be complete in June 2013 and we do not expect to seek future funding.

Summary Budget Information for Activity 1:

ENRTF Budget: \$ 75,000
Amount Spent: \$ 75,000
Balance: \$ 0

Activity Completion Date:

Outcome	Completion Date	Budget
1. Field work – map 60,000 acres in Crow Wing county	October 2013	\$60,000
2. Data entry, analysis, reformulation and digitizing of data collected in outcome 1 above.	May 2014	\$15,000

Activity Status as of January 2012: For Result 1, since July 1, 2011, 47,238 acres have been addressed.

Activity Status as of September 2012: For Activity 1 Outcome 1, an additional 150,008 acres were mapped since the January 2012 status update. For Activity 1 Outcome 2, field documentation is 75% complete, NASIS database work is 15% complete, reformulation is 85% complete and digitizing is 75% complete. NRCS is making improvements to the NASIS database as well as the software for posting new data. As a result the planned posting of a partial Crow Wing County dataset is delayed until spring 2013 at the earliest.

Activity Status as of March 2013: For Activity 1 Outcome 1, an additional 10,300 acres were mapped since the September 2012 update. For Activity 1, Outcome 2, data entry of data collected in FY 2012 (10/2011 – 9/2012) is complete, digitizing of areas mapped in FY 2012 is complete, and quality control of areas mapped in FY 2012 is 1/3 complete. NRCS determined it was more efficient to finish field work in Crow Wing County in 2012 and post the remaining data in June 2014 rather than posting Crow Wing piecemeal.

Activity Status as of November 2013: Field work in Crow Wing County is complete. Digitizing and quality control is ongoing with posting of the remainder of the County on Web Soil Survey scheduled for June 2014.

Activity Status as of March 2014: Crow Wing County digitizing is 80% complete. Data analysis and reformulation (NASIS database population) is 45% complete. The posting of Crow Wing County to Web Soil Survey was extended to September 2014 due to staff reductions at NRCS.

Final Report Summary: A total of 207,546 acres were mapped in Crow Wing County. NRCS surpassed initial acreage projections by 147,000 acres. Crow Wing county data is 99% digitized, and data analysis and reformulation is 95% complete. Posting the remainder of Crow Wing county soil data on Web Soil Survey is planned for January 2015. A NRCS database redesign and staff reductions pushed back the posting of Crow Wing county data to Web Soil Survey. Across both Activity 1 and Activity 2, NRCS contributed over \$1.7 million dollars to the Soil Survey effort.

ACTIVITY 2: Support NRCS in delivering a seamless soil database

Description:

Fix 'gaps' in coverage with additional soil scientists. Tasks include mapping, interpretations, correlation, documentation and digitizing. 3.6 million acres of 'gaps' exist in northeastern Minnesota. ENRTF funds will address about 340,000 acres soil coverage gaps in Koochiching, St. Louis, Lake and Cook counties –mostly non-federal lands. NRCS funds will address about 2 million acres by June 2013. After July 2013, the remaining 1.3 million acres in Voyageurs National Park and the Boundary Waters Canoe Area Wilderness will be addressed with NRCS funds. At this point mapping of all lands in Minnesota (with the exception of Pine County) will be complete and we do not expect to seek future funding.

Summary Budget Information for Activity 2:

ENRTF Budget: \$ 425,000
Amount Spent: \$ 425,000
Balance: \$ 0

Activity Completion Date:

Outcome	Completion	Budget
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	Date	
1. Field work – map 111,000 acres in Lake and Cook County outside Superior National Forest boundary	June 2014	\$110,000
2. Data analysis, reformulation and digitizing data from outcome 1 above.	June 2014	\$25,000
3. Field work – map 230,000 acres in Lake, Cook and St. Louis Counties inside the Superior National Forest boundary	June 2014	\$230,000
4. Data analysis, reformulation and digitizing data from outcome 3 above.	June 2014	\$60,000

Activity Status as of January 2012: For Activity 2, 91,000 acres have been addressed since July 1, 2011, mostly in Lake and Cook counties. Further, another part of Crow Wing County totaling 95,000 acres will be posted on the Web Soil Survey by July 2012. .

Activity Status as of September 2012: For Activity 2, an additional 129,000 acres were mapped in Lake and Cook Counties outside the Superior National Forest. An additional 80,000 acres in Lake, Cook and St. Louis Counties within the Superior National Forest were recorrelated to NRCS Data Map Units from existing United States Forest Service Ecological Land Type phases. The goal is to post a partial data set of Lake and Cook Counties outside the Superior National Forest boundaries by July 2013. The NASIS database and software upgrade may push back the posting date until October 2013.

Activity Status as of March 2013: For Activity 2, an additional 203,137 acres were mapped in Lake and Cook counties outside the Superior National Forest. In Lake and Cook counties, 95% of the data is digitized to the LiDAR base and 40% to the NASIS database. A total of 138,725 acres of US Forest Service land is mapped within Lake, Cook and St. Louis counties. A new project in coordination with the Forest Service has begun mapping soils within the Boundary Waters Canoe Area Wilderness. NRCS is on track to post Lake and Cook county soils data (outside the Superior National Forest boundary) by July 2013.

Activity Status as of November 2013: All private land outside the USFS boundary in Cook and Lake Counties—470,000 acres—has been completed with posting on WEB Soil Survey scheduled for November 2013. An agreement has been reached with the National Park Service to develop a digital soil map for Voyageurs National Park. Correlation of USFS mapping to NRCS conventions continues.

Activity Status as of March 2014: Completed correlation of existing Forest Service ELTPs (ecological land type phases) to NRCS DMUs (data map units) on an additional 530,000 acres within the gross Superior National Forest (SNF) boundary. An intensive field week involving multiple partners is planned for June 2014 to collect transect data within the SNF. Field data collection is complete on over 200 sites within the Boundary Waters Canoe Area Wilderness Area to verify and inform a raster-based digital soil model of nearly 600,000 remote acres in the BWCAW.

Final Report Summary: Nearly 800,000 acres were mapped in Lake, Cook, and St. Louis counties within the Superior National Forest boundary. This exceeded NRCS's original acreage goals. NRCS was able to exceed acreage goals by partnering with the United States Forest Service and utilizing Forest Service ecological land type phases to accelerate mapping. An additional 470,000 acres were mapped in Lake and Cook counties outside the Superior National Forest boundary. This is a significant achievement because all private lands in Lake and Cook counties are now mapped. The mapping of soils outside the Superior National Forest boundary exceeded original mapping goals. Mapping of the Superior National Forest in St. Louis, Lake and Cook counties will be completed in 2016. The Superior National Forest data, approximately 4 million acres, will be posted to Web Soil Survey over the next 3 years. Data analysis, reformulation and digitizing of the Boundary Waters Canoe Area Wilderness will

be completed in 2015. Across both Activity 1 and Activity 2 NRCS contributed over \$1.7 million dollars to the Soil Survey effort. At the outset of this project, NRCS anticipated mapping an additional 3.3 million acres with Federal funding during the project period. Due to Federal budget cuts and staff reductions, NRCS was able to map 1.5 million additional acres during the project period.

V. DISSEMINATION:

Description:

Digital soils maps and soil interpretations will be published on Web Soil Survey.

(<http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm>) Web Soil Survey (WSS) provides soil data and information produced by the National Cooperative Soil Survey. It is operated by the Natural Resources Conservation Service (NRCS) and provides access to the largest natural resource information system in the world. The site is updated and maintained online as the single authoritative source of soil survey information

Status as of January 2012: With the release of the Crane Lake subset of Saint Louis County in 2011, 87 (of 91) soil survey areas are available on Web Soil Survey. Another part of Crow Wing County totaling 95,000 acres will be posted on the Web Soil Survey by July 2012.

Status as of September 2012: Database upgrades necessary for Web Soil Survey posting did not take place by July 2012 as anticipated. NRCS focused soil scientists' efforts on mapping instead of making database and software upgrades. The goal is to post subsets of Crow Wing, Lake and Cook Counties by summer 2013.

Status as of March 2013: Crow Wing County will be posted in its entirety in June 2013. This date was delayed as NRCS determined it was more efficient to finish fieldwork in Crow Wing County in 2012 rather than post partial county data. Lake and Cook County data (outside the Superior National Forest boundary) will be posted in July 2013.

Status as of November 2013: Currently, one geomorphic area in west central Crow Wing County is available on WEB Soil Survey. The remainder of Crow Wing County will be available June 2014. Soil maps for about 470,000 acres of private land in Cook and Lake Counties will be available on the WEB Soil Survey in November 2013. These lands are located outside the boundary of the Superior National Forest. Lands inside the boundary will be available after USFS mapping has been correlated to NRCS conventions.

Status as of March 2014: Portions of private land outside the gross Superior National Forest boundary in Lake and Cook Counties (about 470,000 acres) were posted to Web Soil Survey on Nov. 12, 2013. The remainder of Crow Wing County is scheduled to post to WSS in September 2014. Correlation and mapping of public and private lands within the gross SNF boundary are currently in progress in cooperation with the Forest Service.

Final Report Summary: Portions of private land outside the gross Superior National Forest boundary in Lake and Cook Counties (about 470,000 acres) were posted to Web Soil Survey on Nov. 12, 2013. The remainder of Crow Wing County is scheduled to post to WSS in January, 2015. Correlation and mapping of public and private lands within the gross SNF boundary are currently in progress in cooperation with the Forest Service. There are approximately 4 million acres that will be correlated and posted to WSS within 3 years. About 175,000 acres of that are scattered private lands within the USFS boundary. Those private lands are of the highest priority for the Duluth MLRA Office. NRCS prefers posting a unified USFS/NRCS product and will wait to post once all data is collected, analyzed and reformulated.

VI. PROJECT BUDGET SUMMARY:

A. ENRTF Budget:

Budget Category	\$ Amount	Explanation
Professional/Technical Contracts:	\$ 500,000	Contract 1: \$75,000 to Crow Wing County to support a contribution agreement with NRCS to map 60,000 acres and analyze and digitize data. Contract 2: \$425,000 to Minnesota office of the Federal NRCS to contract with additional soil scientists and detailees. Contract soil scientists and detailees will map, interpret, correlate, documentation and digitize 340,000 acres of 'coverage gaps' in northeastern Minnesota.
TOTAL ENRTF BUDGET:	\$ 500,000	

Explanation of Use of Classified Staff: N/A

Explanation of Capital Expenditures Greater Than \$3,500: N/A

Number of Full-time Equivalent (FTE) funded with this ENRTF appropriation: N/A

B. Other Funds:

Source of Funds	\$ Amount Proposed	\$ Amount Spent	Use of Other Funds
Non-state			
NRCS	\$ 1,785,000	\$1,115,625	NRCS mapping, interpretations, correlation and digitizing 1,785,000 acres remaining in the arrowhead (excluding the BWCAW) at a cost of \$1 per acre.
Crow Wing County	\$ 25,000	\$ 25,000	Office space, LIDAR data and administrative services provided by Crow Wing County as in-kind services during project period.
State			
BWSR staff support, ¼ FTE	\$ 22,000	\$ 13,750	Project management and contract development.
TOTAL OTHER FUNDS:	\$ 1,832,000	\$ 1,154,375	

VII. PROJECT STRATEGY:

A. Project Partners:

The project team is Caryl Radatz, State Soil Scientist, NRCS and Megan Lennon, Soil Scientist, BWSR. The NRCS will receive a total of \$425,000. Caryl Radatz manages all aspects of the Soil Survey Program and Megan Lennon is project manager for LCCMR funds and is the state contact with participating counties and agencies.

B. Project Impact and Long-term Strategy:

This proposal supports the Crow Wing County government agreement with NRCS and provides additional funding to NRCS to achieve seamless coverage of digital soil surveys. Specifically, this

proposal provides funding to NRCS to pay for NRCS soil scientists detailed to Minnesota to assist local soil survey crews. Assuming staffing levels for ongoing soil surveys remain stable and the NRCS is able to secure detailees, we anticipate completing web delivery of soil survey data by mid- 2014. Soil surveys should be web available for the following soil survey areas (indicated year): Cook (2013), Crow Wing (2014), Lake (2013), and Pine (unknown). This is the last proposal seeking funds to map and digitize lands in Minnesota. Upon completion of this proposal, digital soil survey coverage will exist for all lands in Minnesota, with the exception of Pine County, the Boundary Waters Canoe Area and Wilderness (BWCAW) and Voyageurs National Park. Mapping of Voyageurs National Park will begin in 2013 and is paid for through a partnership between NRCS and the National Park Service. Mapping of the BWCAW will begin after June 30, 2013 and paid for with NRCS funds. Digital soil survey products for Voyageurs National Park and the Boundary Waters Canoe Area Wilderness will be available in 2016.

C. Spending History:

Funding Source	M.L. 1997	M.L. 1999	M.L. 2001	M.L. 2003	M.L. 2005 or FY 2006-07	M.L. 2007 or FY 2008	M.L. 2008 or FY 2009	M.L. 2009 or FY 2010	M.L. 2010 or FY 2011	Total
ENRTF	\$145,000 Subd. 10(f)	\$500,000 Subd. 10(c)	\$500,000 Subd. 7(c)	\$236,000 Subd. 8(b)	\$500,000 Subd. 8(b)	\$400,000 Subd. 6(b)	\$400,000 Subd. 5(b)	\$400,000 Subd. 3(c)	\$500,000	\$3,581,000
Cost share funds – cooperating counties	\$30,000	\$196,799	\$293,248	\$219,990	\$113,000	\$45,000	\$1,000,000	\$1,000,000	\$25,000	\$2,923,037
NRCS					\$917,000	\$1,300,000	\$1,000,000	\$1,000,000	\$1,785,000	\$ 6,002,000
In-Kind Contributions (BWSR, NRCS and/or U of M)*	\$ 40,000	\$40,000	\$180,000	\$240,000	\$60,000	\$20,000	\$20,000	\$20,000	\$22,000	\$ 642,000

*estimated

VIII. ACQUISITION/RESTORATION LIST: N/A

IX. MAP(S): *Soil Survey Status 2014*, attached.

X. RESEARCH ADDENDUM: N/A

XI. REPORTING REQUIREMENTS:

Periodic work plan status update reports will be submitted not later than January 2012, September 2012, March 2013, November 2013 and March 2014. A final report and associated products will be submitted between June 30 and August 1, 2014 as requested by the LCCMR.

Final Attachment A: Budget Detail for M.L. 2011 (FY 2012-13) Environment and Natural Resources Trust Fund Projects								
Project Title: Completion of a Statewide Digital Soil Survey								
Legal Citation: M.L. 2011, First Special Session, Chp. 2, Art.3, Sec. 2, Subd. 03c								
Project Manager: Megan Lennon								
M.L. 2011 (FY 2012-13) ENRTF Appropriation: \$ 500,000								
Project Length and Completion Date: 3 years, June 30, 2014								
ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Activity 1 Budget	Spent (6/30/14)	Balance (6/30/14)	Activity 2 Budget	Spent (6/30/14)	Balance (6/30/14)	TOTAL BUDGET	TOTAL BALANCE
BUDGET ITEM	Support Crow Wing County effort with USDA NRCS			Support USDA NRCS in delivering a seamless soil database				
Professional/Technical Contracts							500,000	500,000
Crow Wing County: \$75,000 to support a contribution agreement with NRCS to map 60,000 acres and analyze and digitize data.	75,000	75,000	0				75,000	0
NRCS: suport for existing soil scientists and detailees for mapping, data interpretation, data entry and analysis, data reformulation and correction, and digitizing gaps in soil survey coverage.				425,000	425,000	0	425,000	0
COLUMN TOTAL	\$75,000	\$75,000	\$0	\$425,000	\$425,000	\$0	\$500,000	\$0