



Environment and Natural Resources Trust Fund (ENRTF) M.L. 2017 LCCMR Work Plan

Date of Submission: 5/30/2017

Date of Next Status Update Report: 12/31/2017

Date of Work Plan Approval: 06/07/2017

Project Completion Date: 6/30/2019

Does this submission include an amendment request? No

PROJECT TITLE: County Geologic Atlases – Continuation

Project Manager: Dale Setterholm

Organization: Minnesota Geological Survey, University of Minnesota

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Location: statewide -work will occur in multiple counties potentially including existing projects in Lake, St. Louis, Aitkin, Cass, Olmsted, Dodge, Isanti, Kandiyohi, Rock, Nobles, and new projects not yet determined.

Total ENRTF Project Budget:

ENRTF Appropriation: \$2,000,000

Amount Spent: \$0

Balance: \$2,000,000

Legal Citation: M.L. 2017, Chp. 96, Sec. 2, Subd. 03a

Appropriation Language:

\$2,000,000 in fiscal year 2017 is from the trust fund to the Board of Regents of the University of Minnesota, Minnesota Geological Survey, to continue acceleration of the production of county geologic atlases for the purpose of sustainable management of surface water and groundwater resources. This appropriation is to complete Part A of county geologic atlases, which focuses on the properties and distribution of earth materials in order to define aquifer boundaries and the connection of aquifers to the land surface and surface water resources. This appropriation is available until June 30, 2020, by which time the project must be completed and final products delivered.

I. PROJECT TITLE: Minnesota Geological Survey Geologic Atlases for Water Management

II. PROJECT STATEMENT: Geologic atlases provide maps and databases essential for improved management of ground and surface water resources. This is foundational data that supports water management activities to the benefit of drinking water and aquatic habitat. County Geologic Atlases are specifically identified as essential data in the Statewide Conservation Plan, and in the efforts of the Environmental Quality Board, DNR Waters, and the Water Resources Center at the University of Minnesota to design a sustainable water management process. Geologic Atlases define aquifer boundaries and the connection of aquifers to the land surface and to surface water resources to enable a comprehensive water management effort. The program goal of atlas coverage statewide has benefited from long-term support of LCCMR to accelerate the work.

A complete geologic atlas consists of Part A constructed by the Minnesota Geological Survey (MGS) and focused on geology and the County Well Index, and Part B constructed by the DNR Division of Waters (funded separately) and focused on hydrology. Local participation is a primary factor in determining which counties are chosen for this work, while ground water sensitivity, water demand, and the size of the population served are also considerations. The counties are required to provide funds or in-kind service, typically by establishing accurate locations for water wells. The construction records of water wells are a fundamental data source that describe subsurface conditions, and also tell us where the population is obtaining water.

Atlases enhance natural resource management and regulation, and facilitate wise use of water resources. They support water management activities for sustainable water use and protection and improvement of water quality such as: permitting, land use planning, wellhead protection, remediation, nutrient management, monitoring, modeling, and well construction. Atlas information is used by citizens, local government, counties, and state agencies (SWCDs, MDH, DNR, MPCA, Ag). The atlases document existing conditions so that changes in the water system can be recognized and evaluated. A User's Guide to geologic atlases supports and educates users of all backgrounds.

This project continues an effort to provide county geologic atlases statewide. The first atlas was initiated in 1979. Funding from ENRTF in the early 1990s and from 2007 to the present has greatly accelerated production (see attached map). At this time 48 of the 87 counties (55%) have a completed Part A atlas, or a project underway (30 complete, 13 underway, 3 revised, 2 revisions underway). Annual funding of \$1,927,000 (aggregate from all sources) would achieve statewide coverage in about 11 years. We are creating atlases at a rate of about 5 per year.

This project originally requested \$3,784,700 to accomplish the equivalent of 10 county atlases. The award is 53% of the request, and the project will now accomplish the equivalent of 5 atlases. The term equivalent is used because these funds will finish some atlases already underway, and some that are started will not be complete at the end of the grant. Because of the lower award we anticipate more emphasis on existing projects and fewer new project starts.

III. OVERALL PROJECT STATUS UPDATES:

Project Status as of 12/31/2017:

Project Status as of 6/30/2018:

Project Status as of 12/31/2018:

Project Status as of 6/30/2019:

Overall Project Outcomes and Results:

IV. PROJECT ACTIVITIES AND OUTCOMES:

ACTIVITY 1: Work to complete unfinished atlases from previous grants, and possibly start some new projects.

Description: Current atlas projects in St. Louis, Lake, Olmsted, Dodge, Cass, Isanti, Aitkin, Hennepin, Rock, Nobles, and Kandiyohi, and Hubbard counties are those most likely to need funding from this grant to sustain progress.

Atlases begin with compilation of a database of subsurface information. The most abundant data source is the construction records of water wells. With the cooperation of the local project partner, accurate digital locations are established for these wells to support their use in mapping. Concurrently, geologists visit the project area to describe and sample landforms, and exposures of rock or sediment. An initial assessment of the geologic data is then completed to focus additional data gathering including geophysical surveys, pit excavations, and shallow and deep drilling programs. Lab analysis of glacial sediment samples at MGS yields textural and sand grain rock type data. Analysis of the chemical composition and age of the samples helps define and correlate geologic units, including aquifers. Consideration of the complete data set is then completed and maps and associated databases are formalized and prepared for use in geographic information systems and distribution via DVD and web. Most of the products are also printed for use in the field and by users who prefer this format.

As soon as the funds for this project are secured work will begin in counties that have committed as cooperators and have begun the well location task. Contact will be made with new counties prioritized on the basis of need that may be driven by growth, resource demand, resource vulnerability, or opportunities for cooperation with other water management activities.

Summary Budget Information for Activity 1:

ENRTF Budget: \$ 2,000,000

Amount Spent: \$ 0

Balance: \$ 2,000,000

Outcome	Completion Date
1. Completion of atlases initiated on prior grants (see list above). St. Louis and Lake may not be completely finished by this date.	12/31/2019
2. Continuing digital release of geologic mapping and databases for subproject areas of the Lake and St. Louis project. The series of subprojects that cover parts of these counties allows us to put more people on the job with fewer delays. This will also allow us to complete and digitally publish subproject maps much sooner than maps of the entire county.	2 of 3 bedrock subprojects, and 2 of 4 surficial subprojects by 1/1/2018
3. Progress on new atlas projects (mapping and associated databases). Projects are waiting for attention in Pipestone, Lincoln, Lac Qui Parle, Otter Tail, Steele, Cook, and Pennington counties. Discussions are underway with several other counties likely to pursue atlas projects. We especially pursue those where water sensitivity, population, growth, water growth, or other management issues are present.	6/30/2019

Activity 1 Status as of 12/31/2017:

Activity 1 Status as of 6/30/2018:

Activity 1 Status as of 12/31/2018:

Activity 1 Status as of 6/30/2019:

Final Report Summary:

V. DISSEMINATION:

Description: Every atlas is produced in portable document format, as geographic information systems files, and in printed form. The digital files are available as a DVD, and are also available from the University of Minnesota Digital Conservancy, and via link from the MGS web page

http://www.mnhs.edu/county_atlas/countyatlas.htm. Each project culminates with a meeting held in the project area to present the results to the county staff, and any other interested parties. At these meetings the products are described, access to the products is explained, and examples of applications of the products to common resource management situations are demonstrated. The products of subprojects in St. Louis and Lake counties are being released in digital form immediately following technical review. When all the subproject areas are complete county-wide compilations will be created and distributed digitally and in print. The printed copies are shared with the county, who in turn can distribute them to libraries, schools, townships, and other agencies. They are also distributed by the MGS map sales office. We are currently contacting earth science teachers and other educators about using available printed atlases in classroom exercises. Atlas products are also displayed and explained at educational events for SWCD staff and onsite sewage treatment system contractors.

Status as of 12/31/2017:

Status as of 6/30/2018:

Status as of 12/31/2018:

Status as of 6/30/2019:

Final Report Summary:

VI. PROJECT BUDGET SUMMARY:

A. Preliminary ENRTF Budget Overview:

***This section represents an overview of the preliminary budget at the start of the project. It will be reconciled with actual expenditures at the time of the final report.**

Budget Category	\$ Amount	Overview Explanation
Personnel:	\$ 1,473,035	A team of 20 to 25 MGS staff; includes 27.2 to 33.5% fringe cost depending on class
Professional/Technical/Service Contracts:	\$ 279,000	\$225,000 for drilling; Drilling costs are \$45 to \$75 per foot, depth dependent; this covers 4,700 feet of drilling. Drilling augmented with DNR funds. \$54,000 for analytical services (1,000 geochem analyses @\$40 and 14 geochron analyses @\$1,000; both chosen by competitive bidding.
Equipment/Tools/Supplies:	\$ 34,500	Core boxes (about 2,700 boxes), Giddings Probe expendables (augers, parts , other \$2,750 per county) maps, lab water
Capital Expenditures over \$5,000:	\$ 34,000	Dedicated transport for geophysical logging
Printing:	\$ 72,500	Competitive bid for offset printing; 6 plates 3' by 3', four color per county; 350 to 500 copies per county; 25,000 to 36,000 maps. This would cover printing of about 5 atlases.

Travel Expenses in MN:	\$ 106,965	This covers the cost of putting teams of geologists in the field. It includes meals, lodging, and vehicle rental costs. Most projects require months of field time. Vehicles are rented for field time only.
TOTAL ENRTF BUDGET:	\$ 2,000,000	

Explanation of Use of Classified Staff: N/A

Explanation of Capital Expenditures Greater Than \$5,000: Dedicated transport for geophysical logging equipment, some of which was purchased on LCCMR grants. This equipment is deployed about 200 days per year and supports County Geologic Atlases, other MGS research (including some supported by LCCMR), and also supports MN Dept. of Health well construction regulation.

Total Number of Full-time Equivalents (FTE) Directly Funded with this ENRTF Appropriation: about 18 FTE

Total Number of Full-time Equivalents (FTE) Estimated to Be Funded through Contracts with this ENRTF Appropriation: drilling contract 1 FTE; printing contract 0.2 FTE; analytical services contract 0.5 FTE; total 1.7 FTE

B. Other Funds:

Source of Funds	\$ Amount Proposed	\$ Amount Spent	Use of Other Funds
Non-state			
USGS STATEMAP cost share	\$315,000	\$	pending, CGA mapping cost-share
USGS Great Lakes cost share	\$75,000		pending, CGA mapping cost-share
State			
DNR contract	\$550,000	\$	pending, CGA mapping, drilling augmentation
Clean Water Funds	\$250,000		pending, CGA mapping
TOTAL OTHER FUNDS:	\$1,190,000	\$	

VII. PROJECT STRATEGY:

A. Project Partners: Under a separate workplan and budget DNR Waters and Ecological Services is receiving funds to work on Part B of County Geologic Atlases, and county partners will supply in-kind services.

Partners receiving ENRTF funding

- None in this round of funding. DNR Waters and Ecological Services has grants in place.

Partners NOT receiving ENRTF funding

- DNR Waters and Ecological Services produces Part B of the county geologic atlases- funded separately.
- County partners participate in establishing well locations. They are self-funded.

B. Project Impact and Long-term Strategy:

C. Funding History:

Funding Source and Use of Funds	M.L. 2007 or FY08-10	M.L. 2008 or FY09-12	M.L. 2009 or FY10-13	M.L. 2010 or FY11-14	M.L. 2011 or FY12-14	M.L. 2013 or FY14-16	M.L. 2015 or FY16-18
ENRTF Benton and Chisago CGAs	\$400,000						

ENRTF Blue Earth, Nicollet, Sibley CGAs		\$706,000					
ENRTF Anoka and Wright CGAs			\$820,000				
ENRTF Sherburne and Morrison CGAs and related research				\$1,130,000			
ENRTF Redwood, Meeker, Brown					\$1,200,000		
ENRTF Wadena, Hubbard, Becker						\$1,200,000	
ENRTF St. Louis, Lake, Olmsted update, Kandiyohi, Aitkin							\$2,040,000
Clean Water Funds (Houston, Winona)				\$305,000			
Clean Water Funds (Cass, Isanti, Hennepin update, Dodge, other)						\$1,230,000	

VIII. REPORTING REQUIREMENTS:

- The project is for 2 years, will begin on 07/01/2017, and end on 06/30/2019.
- Periodic project status update reports will be submitted December 31 and June 30 of each year.
- A final report and associated products will be submitted between June 30 and August 15, 2019.

IX. VISUAL COMPONENT or MAP(S): see attached map of County Geologic Atlas Part A Status

Environment and Natural Resources Trust Fund
M.L. 2017 Project Budget



Project Title: County Geologic Atlases - Continuation
Legal Citation: M.L. 2017, Chp. 96, Sec. 2, Subd. 03a
Project Manager: Dale Setterholm
Organization: Minnesota Geological Survey, University of Minnesota
M.L. 2017 ENRTF Appropriation: \$ 2,000,000
Project Length and Completion Date: 2 Years, June 30, 2019
Date of Report: May 26, 2017

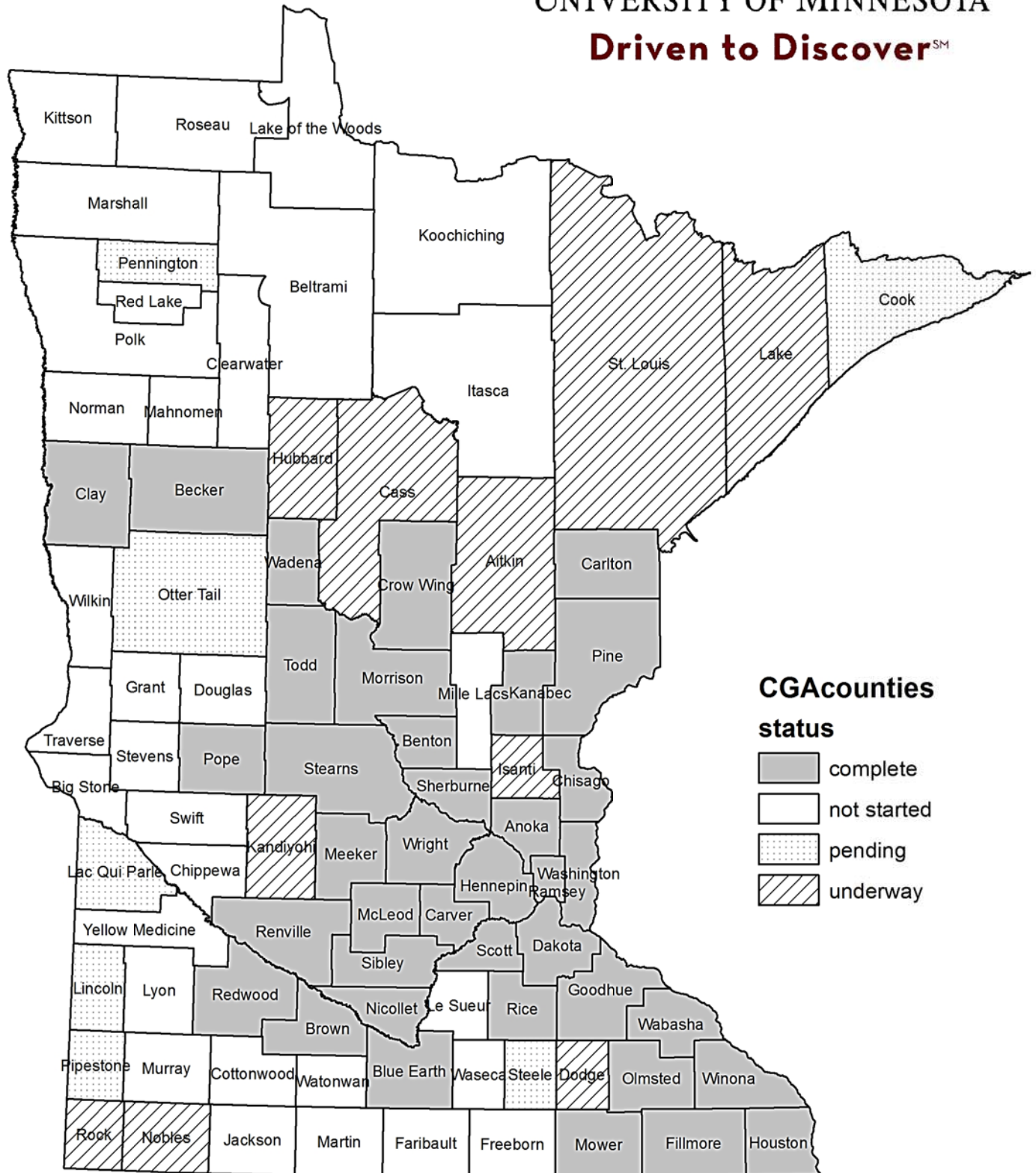
ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Activity 1 Budget	Amount Spent	Activity 1 Balance	TOTAL BUDGET	TOTAL BALANCE
BUDGET ITEM	<i>Initiate new geologic atlases and complete any unfinished atlases</i>				
Personnel (Wages and Benefits)					
Between 20 and 25 MGS staff (mostly geologists but also GIS, hydrogeologist, editor, database specialists, field assistants) will be assigned to work on geologic atlases on a part time basis; chosen based on the skill sets necessary for the geology of the selected counties. The total effort averages about 4 FTE per atlas or about 18 FTE for this proposal. The cost includes the University fringe benefits (27.2% to 33.5% depending on class).	\$1,473,035	\$0	\$1,473,035	\$1,473,035	\$1,473,035
Professional/Technical/Service Contracts					
Rotary-sonic test hole drilling (awarded by a competitive bidding process). Generally 4-6 holes per county for 7 counties drilling this year. Rotasonic method yields 4" undisturbed core of unconsolidated deposits. Average hole cost is \$12,767 but varies with depth. Depth corresponds to depth of bedrock surface. Drilling costs are shared with support from our DNR contract (about one third).	\$225,000		\$225,000	\$225,000	\$225,000
Printing					
Offset printing; awarded by competitive bid; typically 500 copies of each of 6 plates (each 3' by 3' and four color) per county, current prices about \$14,000 per county. Print run has been lowered as there are more online users, and we are exploring means to lower this further. This amount would cover about 5 counties.	\$72,500		\$72,500	\$72,500	\$72,500
Professional/Technical/Service Contracts					
Geochemical and geochronological analyses to support aquifer correlation and delineation; laboratories will be evaluated based on cost and capabilities in accordance with U of M purchasing rules. Contracts or bids as necessary. We anticipate about 1,000 geochem analyses (\$40,000) and 14 geochron analyses (\$14,000).	\$54,000		\$54,000	\$54,000	\$54,000
Equipment/Tools/Supplies					
Field and lab expendables (batteries, sample bags, augers, Giddings Probe repair parts, maps, core boxes (\$21,000), distilled water)	\$34,500		\$34,500	\$34,500	\$34,500
Travel expenses in Minnesota					
Travel: vehicle rental and mileage (approx. \$245 to \$275 per week, \$0.17 to \$0.37 per mile); meals (up to \$46 per day); lodging (\$89 to \$142 per day). Amounts cannot be calculated until project locations (counties) are known. Rentals from U Fleet Services as needed, typically on weekly basis. All costs in accordance with U of M policy.	\$106,965		\$106,965	\$106,965	\$106,965
Other					
Replacement of dedicated transport for borehole geophysical logging equipment. The equipment is permanently mounted in the vehicle. Borehole geophysics operations support atlases, but also Department of Health operations, DNR observation well program, and other uses.	\$34,000		\$34,000	\$34,000	\$34,000
COLUMN TOTAL	\$2,000,000	\$0	\$2,000,000	\$2,000,000	\$2,000,000

Status of Part A Geologic Atlases April 2017



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Note: Scott, Winona, and Washington atlases have been revised, and revisions of Hennepin and Olmsted are underway.

