

M.L. 2015 Project Abstract

For the Period Ending June 30, 2018

PROJECT TITLE: County Geologic Atlases - Part A

PROJECT MANAGER: Dale R. Setterholm

AFFILIATION: Minnesota Geological Survey, University of Minnesota

MAILING ADDRESS: 2609 Territorial Road

CITY/STATE/ZIP: St. Paul, MN 55114-1009

PHONE: 612-626-5119

E-MAIL: sette001@umn.edu

WEBSITE: <http://www.mngs.umn.edu/index.html>

FUNDING SOURCE: Environment and Natural Resources Trust Fund

LEGAL CITATION: M.L. 2015, Chp. 76, Sec. 2, Subd. 03a

APPROPRIATION AMOUNT: \$2,040,000

AMOUNT SPENT: \$2,040,000

AMOUNT REMAINING: \$0

Overall Project Outcomes and Results

This award is the seventh dedicated to creating County Geologic Atlases statewide. Geologic atlases provide maps and databases essential for management of ground and surface water resources. The program currently produces nearly 5 atlases per year, and only 32 counties have not yet been started. An average county atlas requires about \$400,000 and 3 to 4 years to complete. Projects in very large or distant counties, those with particularly complex geology, and those with challenging data sets take more resources and time. This award included work in Lake, St. Louis, and Hennepin counties, all of which required greater than average resources. However, of the 12 atlases we are currently working on 9 are past the halfway mark and a few are nearly finished. This grant funded work in Lake and St. Louis (\$882,684), Olmsted (\$152,975), Kandiyohi (\$129,244), Hennepin (\$372,668), Dodge (\$102,057), Hubbard (\$222,582), Becker (\$136,284), and Aitkin (\$40,791) counties. An additional \$715 supported initiation of work in new project areas. At this time bedrock mapping in Lake and St. Louis counties is about two thirds complete, and glacial mapping is slightly more than half complete. Federal cost-sharing has been applied to this work each year. The Olmsted CGA bedrock map is about 80% complete, and the surficial map about 90% complete. In Dodge County both those maps are at the 90% mark. In Kandiyohi County the surficial map has been drafted, the bedrock topography is about 50% complete, and the bedrock geology is just starting. For the Hennepin CGA the bedrock map is complete, the surficial geology is complete, the bedrock topography is complete, and the mapping of sand bodies is about 40% done. Similarly, in Hubbard County all products are ready except the sand model. In Aitkin County field work was the focus.

Project Results Use and Dissemination

Every atlas is produced in portable document format, as geographic information systems files, and in printed form. The digital files are compiled as a DVD, and are also available from the University of Minnesota Digital Conservancy <https://conservancy.umn.edu/handle/11299/57196>, and via link from the MGS web page. 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 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.



Environment and Natural Resources Trust Fund (ENRTF)

M.L. 2015 Work Plan

Date of Report: July 27, 2017
Date of Next Status Update Report: none
Date of Work Plan Approval: June 11, 2015
Project Completion Date: June 30, 2018
Does this submission include an amendment request? no

PROJECT TITLE: County Geologic Atlases - Part A

Project Manager: Dale R. Setterholm

Organization: Minnesota Geological Survey, University of Minnesota

Mailing Address: 2609 Territorial Road

City/State/Zip Code: St. Paul, MN 55114-1009

Telephone Number: (612) 626-5119

Email Address: sette001@umn.edu

Web Address: <http://www.mngs.umn.edu/index.html>

Location: statewide -work will occur in multiple counties including Lake and St. Louis, and others not yet determined. Current projects include atlases for St. Louis, Lake, Olmsted, Kandiyohi, Hennepin, Dodge, Hubbard, Becker, and Aitkin counties.

Total ENRTF Project Budget: \$2,040,000	ENRTF Appropriation: \$2,040,000
	Amount Spent: \$2,040,000
	Balance: \$0

Legal Citation: M.L. 2015, Chp. 76, Sec. 2, Subd. 03a

Appropriation Language:

\$2,040,000 the first year is from the trust fund to the Board of Regents of the University of Minnesota for the Minnesota Geological Survey to continue the 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, 2018, by which time the project must be completed and final products delivered.

I. PROJECT TITLE: County Geologic Atlases – Part A

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 describes subsurface conditions, and also tells 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 37% of the state has a completed Part A atlas, or a project underway. Annual funding of \$1,750,000 (aggregate from all sources) would achieve statewide coverage in about 14 years.

III. OVERALL PROJECT STATUS UPDATES:

Project Status as of 12/31/15: Current activity includes initiating new projects in Olmsted (update), Kandiyohi, and Aitkin counties, and continuing projects in St. Louis, Lake, Hennepin (update), Hubbard, and Becker counties. The St. Louis and Lake atlases are progressing as a series of subprojects (3 bedrock, 4 glacial) which will be completed and released digitally, and then combined when the entire project culminates. We are asking our county partners to focus their efforts in these same subproject areas such that the well data is available to our mappers, and we are prioritizing those parts of the counties where water resources issues exist. The first subproject is receiving federal cost-sharing for the bedrock geologic map and requires that it be completed by June 30, 2016. The surficial geologic map is on a similar schedule, and will be followed by the subsurface glacial products. The bedrock mappers will move on to the next subproject area immediately, and the glacial mappers will lag somewhat because of the number of products they must create for each area. In Kandiyohi and Aitkin counties the local partners are establishing locations for wells, and our work will begin in earnest in this next 6 month period. The Hubbard and Becker CGA projects have been transferred to this funding from our 2013 grant so that there are sufficient funds to complete more mature projects. The surficial maps for these counties are complete; the drilling is complete for Becker and is currently underway in Hubbard County. Bedrock mapping and the subsurface glacial products will advance concurrently in the period ahead. Dodge County had all the well locations established before the project was initiated and this has allowed us to work on the bedrock mapping earlier in the project. A draft of the surficial map is being constructed as well. In Olmsted County the well location work is underway and we are focused on the surficial geologic map. Bedrock work will advance when the well locations are complete. The update of the Hennepin CGA is a very data intensive project with

more than 20,000 well records to support the maps. The shallow drilling and sampling to support the surficial geologic map is done, and analysis of the samples is underway. Soon a draft compilation of the map will be created, and then tested with additional field work in the spring. The bedrock mapper has interpreted about 90% of the well records, drafted 90% of the bedrock topography, and has started compiling the bedrock geology.

Project Status as of 6/30/16: The St. Louis and Lake atlases are progressing as a series of subprojects (3 bedrock, 4 glacial) which will be completed and released digitally, and then combined when the entire project culminates. A draft bedrock map of the first bedrock subproject will be complete this month. The bedrock map of the second subproject area will commence at that time, and is cost-shared with federal funds and due in one year. The surficial geologic map of the first subproject will be complete later this year. This summer is devoted to field work in the second subproject area. Drilling will take place for subproject areas 1 and 2 this fall or early winter. The Hennepin surficial and bedrock maps are being compiled and should reach draft form ready for review in the next period. Drilling will take place this winter, as will work on the glacial subsurface products. In Dodge County the bedrock map is nearly in draft form and the field work for the surficial map will be complete soon. In Olmsted County work is underway on the surficial field work and compilation, and work on the bedrock map will start mid-summer. In Aitkin County no surficial geologist is yet available. Bedrock field work may get done later this fall. The county is working on the well location. In Becker County the glacial subsurface products are in review, and the sand model is all that remains. In Hubbard County the glacial subsurface products and sand model are all that remains to be completed.

Project Status as of 12/31/16: The St. Louis and Lake atlases are progressing as a series of subprojects (3 bedrock, 4 glacial) which will be completed and released digitally, and then combined when the entire project culminates. At this time the first bedrock map area (which includes the area of mining exploration) has been completed and posted to our web page. The second bedrock area (southern parts of St. Louis and Lake) is underway and will be completed by June 30. Both of these were aided by federal cost-sharing. Mapping of the glacial materials is complete for the first subproject area, and field work and drilling is complete for the first two subproject areas. The surficial and bedrock geologic maps of Hennepin County are in draft form and entering technical review and revision. Drilling will commence in a matter of days and should be complete in a few weeks. The glacial subsurface mapping will be the focus through the period ahead. In Olmsted County the surficial mapping is in compilation stage and a draft map should be available in the period ahead. The bedrock map is similarly advanced, and a draft should be ready for review by the close of the period ahead. This project has been moved to DNR funding. Field work on the surficial geology has been initiated in Aitkin County and the county has made good progress on well locating. This project will not advance much this winter. Becker County has been completed. The surficial geologic map of Hubbard is complete and we hope to have the subsurface glacial mapping in review by the end of the period ahead. The bedrock mapping is about 80% complete for Dodge County, and the surficial geologic map is in compilation stage. This project will not get much attention in the next few months. The surficial geologic map of Kandiyohi has completed the field work stage and compilation is underway. The geologist on this project will be assigned to other projects for the next few months.

Project Status as of 7/11/17 (final): The grant funds have been completely expended. The overall rate of spending on County Geologic Atlases has increased due to working on more projects simultaneously (with more staff), working in areas with increased geologic complexity and data, more field work required, and more personnel time required. This caused us to expend all funds (from all sources) about 1 month prior to receiving new funds. However, much has been accomplished. This grant funded work in Lake and St. Louis (\$882,684), Olmsted (\$152,975, Kandiyohi (\$129,244), Hennepin (\$372,668), Dodge (\$102,057), Hubbard (\$222,582), Becker (\$136,284), and Aitkin (\$40,791) counties. An additional \$715 supported initiation of work in new project areas. At this time bedrock mapping in Lake and St. Louis counties is about two thirds complete, and glacial mapping is slightly more than half complete. Good progress has been made on associated databases. Federal cost-sharing has been applied to this work each year. Revision of the Olmsted CGA is well along. The bedrock map is about

80% complete, and the surficial map about 90% complete. In Dodge County both those maps are at the 90% mark. In Kandiyohi County the surficial map has been drafted for review, the bedrock topography is about 50% complete, and the bedrock geology is just starting. For the Hennepin CGA the bedrock map is complete, the surficial geology is complete, the bedrock topography is complete, and the mapping of sand bodies is about 40% done. Similarly, in Hubbard County all products are ready except the sand modeling. The work in Aitkin County is in the early stages with mostly field work underway to support maps.

Amendment Request (07/21/2017):

As the work neared completion we identified about \$5,000 in the travel category that was not needed, and those funds were needed in the wages and benefits category. As shown in the budget spreadsheet we would like permission to reallocate those funds.

Amendment Approved: [07/26/2017]

Overall Project Outcomes and Results:

IV. PROJECT ACTIVITIES AND OUTCOMES:

ACTIVITY 1: Initiate new geologic atlases, and complete any unfinished atlases from previous grants.

Description: Atlas projects from the 2013 grant (Wadena, Hubbard, and Becker counties) are those most likely to need funding from this grant to reach completion. Agreements with St. Louis and Lake Counties are in effect and these new projects will be funded from this grant. Work in those counties will proceed as a series of subproject areas, with the results being released as digital products immediately following technical review. The final compilation of all the subproject products as county-wide maps will be produced in digital form, and printed, although that will not be completed in the term of this grant.

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. Analysis 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 additional counties will be contacted to find willing and able local partners. This effort will begin with 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: \$ 2,040,000
Amount Spent: \$ 2,040,000
Balance: \$ 0

Outcome	Completion Date
1. Completion of atlases initiated on prior grants. The atlases of Meeker, Redwood, and Brown counties are nearing completion but may need funds to finish. Atlases of Wadena, Becker, and Hubbard counties would be next in line for assistance if needed.	12/31/17
2. Digital release of geologic mapping and databases for at least one subproject area. The atlases of St. Louis and Lake counties will be completed in a series of subprojects that cover parts of these counties. This will allow us to put more people on the job without fewer delays. For example, as soon as the database is completed for a	12/31/17

subproject the geologists can start their work. If they waited for the databases to be completed for the entire county the delay would be significant. This will also allow us to complete and digitally publish subproject maps much sooner than maps of the entire county.	
3. Progress on new atlas projects (mapping and associated databases). Discussions are underway with several counties likely to pursue atlas projects. We especially pursue those where water sensitivity, population, growth, water growth, or other management issues are present.	6/30/18

Activity Status as of 12/31/15: The Meeker CGA was completed under our 2013 grant and the Redwood and Brown CGAs are still supported by that grant. It seems likely that Redwood will be completed and Brown will likely be transferred to this grant for its final steps. Similarly the Hubbard and Becker CGAs have been transferred to this grant and we hope to finish the Wadena CGA under the older grant. That county has received more federal cost-sharing and this accelerated progress. Historically we exerted some “steering” of the program by contacting counties we thought were a high priority and soliciting participation. Recently, more counties are aware of the benefits of the program and they are actively seeking to participate. Examples are Aitkin, Olmsted (update) and Dodge. There are other counties (Rock, Nobles, Pipestone, Lincoln, Otter Tail) that have signed agreements to participate and will start the well location work, but will wait for MGS to initiate work based on its funding and schedule. Aitkin County and Kandiyohi County are currently establishing well locations, and MGS staff will initiate work in this 6 month period. In Becker County the well database, surficial geology, and deep drilling are complete, and work on the subsurface and bedrock are well underway. In Hubbard County the local partner is just finishing well locations, the surficial map is complete, the deep drilling is underway, and the subsurface and bedrock products will be the focus going forward. In Dodge County the database is complete, interpretation of the well records and drafting the bedrock topography are about 75% complete, and compilation of the bedrock map is about 70% complete. The field work for the surficial geology is about half done. In Olmsted County (update) the surficial geology field work is about half done, and the bedrock topography about a third complete. The glacial sediment in this county is very thin, and won’t require the same products (stratigraphy and sand model) that a typical Minnesota county would need. Special attention will be focused on those few areas where the glacial materials have substantial thickness. The first subproject of the St. Louis and Lake CGAs was the site of intense field work this past season. The bedrock geologic map will be supported by a thorough review of past work (including digitizing all reported outcrops), data provided by one or more current mining exploration firms, MGS and other geophysical surveys, and the intense mapping and sampling we conducted this season. The bedrock map for this subproject is receiving federal cost-sharing funds that enable extra effort, and also require a map to be substantially complete by June 30, 2016. The surficial geology was supported by about 60 pits excavated by mini-backhoe. A surficial geologic map will be well along by the end of this period, but the subsurface work will require some drilling next fall/winter. We may need to assign more resources to the glacial mapping to enable them to keep pace with the bedrock work.

Activity Status as of 6/30/16: The Meeker CGA is complete, and the Brown, Redwood, and Wadena atlases are being completed with Clean Water Funds. The Becker Atlas is nearing completion, and the Hubbard Atlas has all database and bedrock components completed and we are focused on the glacial subsurface products. The Lake, St. Louis, and Hennepin atlases are challenging us in many ways. The Hennepin Atlas is data intense, with about 20,000 wells to guide mapping. This is helpful, but takes extra time. The Lake and St. Louis projects are challenging in the amount of outcrop for the bedrock mappers which requires extra field and office time, and in the amount of field work for the glacial mappers with difficult access due to the lack of roads. These projects will not be typical in cost or schedule, as we predicted. The Dodge and Olmsted projects have moved ahead quickly with the counties completing their well location tasks quickly. Work on the bedrock map of Dodge is well along, and field work on the glacial deposits also well along. Kandiyohi County also did very well on establishing well locations and field work on the glacial deposits is progressing nicely. In Aitkin County the county is locating wells, and we have assigned a bedrock geologist. The next available glacial mapper will be assigned, probably later this year.

Activity Status as of 12/31/16: The Brown, Redwood, Wadena, and Becker atlases have been completed, and Hubbard should be in review within 6 months. As expected, the Lake, St. Louis, and Hennepin atlases are taking longer than typical atlases, but not longer than we anticipated. The bedrock team working in Lake and St. Louis has made impressive progress and their products are equally impressive. The addition of staff, and the high costs of these three projects have caused us to spend this grant more quickly than we anticipated. It is likely we will complete this grant in the months ahead, a full year ahead of its statutory end date. We are moving forward with Olmsted under other funding, and Dodge, Kandiyohi, and Aitkin will be temporarily slowed until it becomes clear if there are funds in non-salary categories in this grant that can be converted to salary. When that situation is clearer we will request an amendment to move funds into the correct categories to move the work ahead efficiently. When new funds are available we have the staff capacity to get these projects moving ahead.

Activity Status as of 7/11/17 (final): For the St. Louis and Lake CGAs the bedrock mapping is two-thirds done (open-filed for use) and the surficial mapping is about 60% done. The subsurface glacial products are complete for one of four subproject areas and nearly done for a second area. This will be the final field season for the bedrock mappers and then they will join all their mapping into one map. A second and final phase of drilling will take place this Fall/Winter. The Olmsted and Dodge projects have been moved to DNR funding. Dodge is further along than Olmsted, but both are on schedule. The only product not yet completed for the Hennepin CGA is the glacial subsurface products which are about 40% complete, and about 6 months from completion. In Kandiyohi County the surficial map is drafted, the bedrock topography nearly done, and the bedrock just starting. We will drill this county this season. All the products of the Hubbard CGA except the sand model are complete. The database is ready in Aitkin County and field work is underway. The Becker CGA is complete, printed, and delivered.

Final Report Summary: We have accomplished the expected outcomes of the project, on an accelerated schedule. Several of the projects this grant was applied to are particularly resource intensive (St. Louis, Lake, Hennepin). This is due to the size of the study areas, the amount of data to be processed, geologic complexity, travel distance, and previous work. The progress on Lake and St. Louis has exceeded expectations, but it took nearly half of the grant to accomplish that. Of the 12 atlases we are currently working on 9 are past the halfway mark and a few are nearly finished. The number of projects that reach completion within a grant period varies greatly, but the amount of progress within a grant is generally very consistent. This grant probably advanced our work more than most.

V. DISSEMINATION:

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

Status as of 12/31/15: After just 6 months there isn't much work in a condition to be shared. As products go through review and editing we will make them available.

Status as of 6/30/16: Some of the products of the Brown, Becker, and Wadena CGAs are available in draft form. Most of these projects will be completed in the period ahead and final products posted to the web and distributed in print form. The Redwood CGA has been printed, and will be delivered and posted to the web soon.

Status as of 12/31/16: The Redwood and Wadena products are posted on the web site and local meetings have been held. The Becker and Brown products will be on the web site within 30 days, and meetings scheduled for this winter. All of these have been printed. The first products of the Lake and St. Louis CGAs have been posted to the University’s Digital Conservancy at <http://hdl.handle.net/11299/183258>. This is an attempt to make products available as quickly as possible. Compilations will be made when all products are complete. A meeting was held with Elizabeth Lincoln of the Minnesota Legislative Reference Library, and a plan is in place to put a complete set of Part A and Part B of all completed CGAs in the collection. This should be accomplished in less than a month.

Status as of 7/11/17 (final): The Becker and Brown CGAs have been posted to the MGS web site and linked to the University’s Digital Conservancy at <https://conservancy.umn.edu/handle/11299/184650> and <https://conservancy.umn.edu/handle/11299/183489>. The second bedrock map (of 3) and the second surficial map (of 4) from the Lake and St. Louis CGAs are now posted to the conservancy.

VI. PROJECT BUDGET SUMMARY:

A. ENRTF Budget Overview:

Budget Category	\$ Amount	Overview Explanation
Personnel:	\$ 1,484,100	Equivalent to about 19 FTE civil service employees; most work on sponsored projects about 72% time and on base funds the remainder. Students cost less and are not included in this calculation. Includes geologists, geophysicist, editor, GIS technicians.
Professional/Technical/Service Contracts:	\$ 357,000	Approx. \$300,000 in rotasonic drilling services (competitive bid); the cost of drilling is estimated based on the number of atlases this grant would cover, and past drilling costs. Approx. \$50,000 for excavation of test pits (as many as 375 pits) in areas where auger drilling is not effective.
Equipment/Tools/Supplies/Services:	\$ 30,600	expendables for field and laboratory work (sample bags, batteries, lab chemicals, distilled water, notebooks, augers, stakes, flagging, notebooks, microscopy supplies, rock saw blades) ; lab analyses; equipment repairs for auger drill, other equipment; boat and ATV rental
Printing:	\$ 45,900	bid process; typically 6 plates per county (size about 3’ by 3’), four color, and 1,500 copies of each for 3 counties equals 27,000 maps
Travel Expenses in MN:	\$ 122,400	food, lodging, vehicle rental from University Fleet as necessary for field work (typically weekly)
Other:	\$	
TOTAL ENRTF BUDGET:	\$2,040,000	

Explanation of Use of Classified Staff: N/A

Explanation of Capital Expenditures Greater Than \$5,000: N/A

Number of Full-time Equivalents (FTE) Directly Funded with this ENRTF Appropriation: About 19 FTE.

Number of Full-time Equivalents (FTE) Estimated to Be Funded through Contracts with this ENRTF Appropriation: Insufficient knowledge to estimate labor component of drilling or printing or excavation contracts.

B. Other Funds:

Source of Funds	\$ Amount Proposed	\$ Amount Spent	Use of Other Funds
Non-state			
USGS STATEMAP Program Bedrock geology, cent. Arrowhead and southern Arrowhead; Surficial geology- Hubbard	\$150,000 est.	\$ \$219,880 \$29,218	Bedrock geology of first two subprojects Surficial geology Hubbard CGA
State			
Clean Water Legacy Funds	\$	\$25,000	DNR may will provided funds to augment the rotasonic drilling program (more or deeper holes)- to Hubbard CGA
In-kind Services During Project Period: participating counties are expected to provide accurate locations of water wells.			The value of this work is difficult to estimate as methods and other factors vary from county to county.
TOTAL OTHER FUNDS:	\$150,000	\$274,098	pending

VII. PROJECT STRATEGY:

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

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
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
Clean Water Funds (Houston, Winona)				\$305,000		

Clean Water Funds (Cass, Isanti, Hennepin update, Dodge, other)						\$1,230,000
---	--	--	--	--	--	-------------

VIII. FEE TITLE ACQUISITION/CONSERVATION EASEMENT/RESTORATION REQUIREMENTS:

A. Parcel List: N/A

B. Acquisition/Restoration Information: N/A

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

X. RESEARCH ADDENDUM: N/A

XI. REPORTING REQUIREMENTS:

Periodic work plan status update reports will be submitted no later than January 2016, July 2016, January 2017, July 2017, January 2018, and July 2018. A final report and associated products will be submitted between June 30 and August 15, 2018.

**Environment and Natural Resources Trust Fund
M.L. 2015 Project Budget**



Project Title: County Geologic Atlases – Part A

Legal Citation: M.L. 2015, Chp. 76, Sec. 2, Subd. 03a

Project Manager: Dale Setterholm

Organization: Minnesota Geological Survey, University of Minnesota

M.L. 2015 ENRTF Appropriation: \$ 2,040,000

Project Length and Completion Date: June 30, 2018

Date of Report: 7/20/17

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Activity 1 Budget	Amount Spent	Activity 1 Balance	TOTAL BUDGET	TOTAL BALANCE
BUDGET ITEM					
Personnel (Wages and Benefits)					
Personnel: Between 15 and 20 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 3 FTE per atlas or about 19 FTE for this proposal. The cost includes the University benefits (26.3%; currently 26.0%).	\$1,699,878	\$1,699,878	\$0	\$1,699,878	\$0
Professional/Technical/Service Contracts					
Contracts: rotasonic test hole drilling (awarded by a competitive bidding process). Generally 3-6 holes per county, based on 3 counties. Rotasonic method yields 4" undisturbed core of unconsolidated deposits. Rates increase from \$45/ft near surface to \$75/ft at depths exceeding 400'. There will also be geochemical and geochronologic analyses.	\$193,974	\$193,974	\$0	\$193,974	\$0
Contracts: test pit excavation (up to 375 pits) in areas where auger drilling is not possible.	\$8,047	\$8,047	\$0	\$8,047	\$0
Equipment/Tools/Supplies					
Field and lab expendables (batteries, sample bags, augers, Giddings Probe repair parts, maps, core boxes, etc.); watercraft and ATV rental	\$32,706	\$32,706	\$0	\$32,706	\$0
Printing					
offset printing awarded by competitive bid or price comparison; typically 1,000 copies of each of 6 plates per county, 3 counties, 18,000 maps, 3' by 3' four color; print run has been lowered as there are more online users	\$14,320	\$14,320	\$0	\$14,320	\$0
Travel expenses in Minnesota					
vehicle rental and mileage (approx. \$40 to \$47 per day, \$0.17 to \$0.37 per mile); meals (up to \$46 per day); lodging (up to \$125 per day). Amounts cannot be calculated until project locations (counties) are known. Rentals from U Fleet Services as needed, typically on weekly basis.	\$91,075	\$91,075	\$0	\$91,075	\$0
COLUMN TOTAL	\$2,040,000	\$2,040,000	\$0	\$2,040,000	\$0