

ML 2013 Project Abstract

For the Period Ending June 30, 2017

PROJECT TITLE: County Geologic Atlas (Part B) for Water Resource Sustainability

PROJECT MANAGER: Jim Berg

AFFILIATION: Minnesota Department of Natural Resources

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FUNDING SOURCE: Environment and Natural Resources Trust Fund

LEGAL CITATION: M.L. 2013, Chp. 52, Sec. 2, Subd. 03c and M.L. 2016, Chapter 186, Section 2, Subdivision 18

APPROPRIATION AMOUNT: \$1,200,000

AMOUNT SPENT: \$1,200,000

AMOUNT REMAINING: \$0

Overall Project Outcomes and Results

The County Geologic Atlas and Special Projects unit provides information about groundwater to help citizens and organizations improve sustainable management of groundwater resources. Delineated and mapped aquifers, recharge areas, and springsheds are essential information to help guide management decisions.

The County Geologic Atlas (CGA) Part B describes the hydrogeologic setting, water levels, chemistry, pollution sensitivity, and groundwater use in a county. It includes selected hydrogeologic cross sections indicating groundwater flow direction, residence time within aquifers and groundwater-surface water interactions. Completed counties that were partially funded by this project include Chisago, Nicollet, Sibley, Blue Earth, and Anoka. Also partially funded by this project, with plans to complete after June 30, 2017, are Renville, Clay, Sherburne, Wright, Houston, Winona, Morrison, and Meeker counties.

The Minnesota Hydrogeology Atlas (MHA) contains statewide thematic maps that have compiled information previously only available in the county format. This wider information is useful in multi-county or watershed evaluations. Statewide thematic maps include "Pollution Sensitivity of the Bedrock Surface" (HG-01), "Pollution Sensitivity of Near-Surface Materials" (HG-02), "Water-Table Elevation and Depth" (HG-03), and Minnesota Regions Prone to Surface Karst Feature Development (GW-01). Method documents (found on the Resources web page) include: "Methods to Estimate Near-Surface Pollution Sensitivity" (GW-03), and "Methods for Estimating Water-table Elevation and Depth to Water Table" (GW-04).

Springshed Mapping partial funding was provided to determine the size and nature of the land area contributing to groundwater and spring discharge. Studies are conducted by introducing dye into sinkholes or sinking streams and monitoring resurgences at nearby springs. Understanding the extent of springsheds is important for protection of numerous trout fisheries in southeastern Minnesota. Over 100 springshed mapping reports are now available on the "Dye Trace Reports" page. The current area of mapped springsheds in Minnesota is 348 square miles.

Project Results Use and Dissemination

This funding helps produce three types of products, found at:

http://www.dnr.state.mn.us/waters/groundwater_section/mapping/atlas.html and described as follows.

Activity 1 – County Geologic Atlas, Part B

DNR staff assisted with development and delivery of training sessions at four Soil and Water Conservation District (SWCD) conferences at various locations in the state in 2015 DNR presented information about CGA content and uses.

Activity 2 – Minnesota Hydrogeologic Atlas

Springshed mapping and preliminary MHA results were presented at the University of Minnesota Water Resources Conference in September 2015.

DNR CGA staff and others presented general groundwater education workshops to Soil and Water Conservation District (SWCD) in Duluth, Thief River, and St. Peter in 2016. The workshops provided examples of how to use the MHA products.

Activity 3 -- Springshed Mapping

The springshed work was the subject of a feature article in the March-April 2016 issue of the Minnesota Conservation Volunteer (113,000 copies in print). The article emphasized the importance of land use management and the discovery that springs emanating from deep strata in the incised valleys of the Driftless Area can be connected to the land surface. The article is available on-line at:

<http://www.dnr.state.mn.us/mcvmagazine/issues/2016/mar-apr/springshed-mapping.html>



Environment and Natural Resources Trust Fund (ENRTF) M.L. 2013 Work Plan Final Report

Date of Status Update Report: August 4, 2017

Date of Next Status Update Report: Final Report

Date of Work Plan Approval: June 25, 2013

Project Completion Date: 4 years, June 30, 2017

Is this an amendment request? no

PROJECT TITLE: County Geologic Atlas (Part B) for Water Resource Sustainability

Project Manager: Jim Berg

Affiliation: Minnesota Department of Natural Resources

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Web Address: www.mndnr.gov

Location: Anoka, Blue Earth, Chisago, Clay, Houston, Morrison, Nicollet, Renville, Sherburne, Sibley, Winona, Wright, Olmsted and Meeker.

Total ENRTF Project Budget:

ENRTF Appropriation: \$1,200,000

Amount Spent: \$1,200,000

Balance: \$0

Legal Citation: M.L. 2013, Chp. 52, Sec. 2, Subd. 03c and
M.L. 2016, Chapter 186, Section 2, Subdivision 18

Appropriation Language:

\$1,200,000 the first year is from the trust fund to the commissioner of natural resources to continue the analysis and compilation of groundwater data for the production of county geologic atlases, publication of geospatial groundwater data, and continued mapping of springsheds and karst features for Winona and Houston Counties. This appropriation is available until June 30, 2016, by which time the project must be completed and final products delivered.

Carryforward: (a) The availability of the appropriations for the following projects are extended to June 30, 2017:
(1) Laws 2013, chapter 52, section 2, subdivision 3, paragraph (c), County Geologic Atlases - Part B

I. PROJECT TITLE: County Geologic Atlas (Part B) for Water Resource Sustainability

II. PROJECT STATEMENT:

A geologic atlas provides information that is essential to sustainable management of Minnesota's groundwater resources by identifying key areas to protect our drinking water and ensure sustainable use. Atlases define aquifer boundaries and identify the interconnection of aquifers to other aquifers, to the land surface, and to surface water resources. Delineation and mapping of aquifers, recharge areas, and springsheds is an essential first step to inform management decisions that will protect water supplies, public health, and the resource. This project will complete, continue, or initiate up to seven Part B projects initiated or planned under previous funding, including Anoka, Blue Earth, Chisago, Clay, Nicollet, Renville, Sibley, and Wright counties. Work may be initiated on Morrison, Sherburne, Olmsted and Meeker counties.

Each atlas project includes some or all of the following work components: assembly of data layers and development of conceptual hydrogeologic models; development of maps of the water table; development of maps of aquifers; groundwater sample collection and laboratory analysis; analysis and interpretation of chemistry data; geophysics field data collection and analysis; preliminary technical analysis and maps of groundwater systems; construction of hydrogeologic cross sections; construction of maps of pollution sensitivity; preparation of final atlas report and publication, training of local atlas users, and dissemination of data.

This project will also initiate the assembly of previously published county atlas groundwater maps into geospatial data layers for use in decision-support systems, such as DNR's new electronic permitting process and DNR's on-line web-based applications such as Watershed Assessment Tool. These assembled data layers and electronic tools make the information more accessible for local, regional, and state decision makers.

Many of Minnesota's surface water resources, such as the trout streams in Southeastern Minnesota, are dependent on groundwater discharge. Trout streams rely on cold water from springs and are under increasing pressure from changing land use patterns and groundwater withdrawals. Delineation of the recharge areas (springsheds) for springs is crucial for the protection of the southeastern Minnesota trout fisheries and the restoration of degraded fisheries. These springsheds are formed in the karsted bedrock units of southeast Minnesota. This project will continue springshed mapping with a focus on Winona and Houston counties. This project will also begin preparation of draft karst plates for each of the Winona and Houston county geologic atlases, Part B, for publication with future completed reports.

III. PROJECT STATUS UPDATES:

Project Status as of February 25, 2014 [budget update as of December 31, 2013]:

Limited activity completed this reporting period. The planned contracts for chemistry and isotope analysis laboratories and with the Minnesota Geological Survey for technical support were executed. Related work in support of county geologic atlases and springshed mapping has proceeded this report period with funding from M.L. 2011, First Special Session, Chp. 2, Art. 3, Sec. 2, 03b2, 'County Geologic Atlases for Sustainable Water Management' and from the M.L. 2013 Clean Water appropriation for atlas completion.

Project Status Date December 26, 2014 (Work Plan update for July 15, 2014) [budget update as of June 30, 2014]:

Limited activity completed this reporting period. The planned contracts for chemistry and isotope analysis laboratories and with the Minnesota Geological Survey for technical support are in place and ready to use when needed. Related work in support of county geologic atlases and springshed mapping has primarily proceeded this report period with funding from M.L. 2011, First Special Session, Chp. 2, Art. 3, Sec. 2, 03b2, 'County Geologic Atlases for Sustainable Water Management' and from the M.L. 2013 Clean Water appropriation for atlas completion.

Project Status as of: January 20, 2015 [budget update as of December 31, 2014]:

Part B report development continued, in particular preparing final draft form of the new booklet-style Part B report. The new booklet style will include several fold-in plates for larger maps or illustrations. The Part B atlas data assembly of geospatial data began during this report period with analysis of the near-surface pollution sensitivity and the water table layers. A dye trace was conducted in the Stockton area along with updating related GIS and springshed data.

Project Status January 22, 2016 [status and budget update as of July 15, 2015]:

The Chisago County Geologic Atlas Part B was printed; maps and data were added to the DNR website. Work continued, including collecting groundwater samples, technical analysis, and report preparation of atlas Part B projects underway. The DNR website for the County Geologic Atlas material was revised and data added http://www.dnr.state.mn.us/waters/groundwater_section/mapping/status.html . Work continued or began on four map layers for the state wide map series: near-surface pollution sensitivity, pollution sensitivity of the bedrock surface, water table elevation, and water table depth. Several dye traces were concluded or completed, adding to the existing springshed map and improving understanding of karst landscape units.

Amendment Request (02/09/2016), Approved March 1, 2016:

We request that the project manager be changed from Jan Falteisek to Jim Berg since Jan has retired from the DNR.

Project Status as of February 29, 2016 [status and budget update as of January 15, 2016]:

All of the Anoka county geologic atlas (CGA) draft text and graphics were completed and most of the Sherburne graphics were completed. Major graphic elements for both atlases included: hydrogeologic cross sections; potentiometric surfaces/groundwater flow directions of buried sand and bedrock aquifers; pollution sensitivity maps and groundwater residence time comparisons; maps of selected chemical constituents (chloride, nitrates and arsenic) in groundwater; selected well hydrograph comparisons; distribution of stable isotope data (oxygen and hydrogen) in groundwater to determine locations of evaporative signature water from lakes; and groundwater use maps and tables.

Amendment request (March 1, 2016) Approved May 25, 2016

Due primarily to salary savings from unfilled positions, not all the funding for this project will be used by the end of the 2016 fiscal year. We request that all remaining funds be continued into the 2017 fiscal year for use in this project.

Project Status as of July 18, 2016 [status and budget update as of July 11, 2016]:

The Blue Earth County Geologic Atlas, Part B was completed, printed, and data were made available online (http://www.dnr.state.mn.us/waters/programs/gw_section/mapping/platesum/bluecga.html). An internal draft of the Nicollet County atlas was completed. Publication of the Nicollet CGA, Part B is expected during the summer of 2016 followed soon after by the Sibley CGA, Part B. Significant progress was made creating and modifying hydrogeological cross sections and maps for the Anoka, Renville, Wright, Sherburne and Clay atlases. Ten carbon-14 samples were collected at selected wells in Clay County. General chemistry, trace constituent and tritium samples were collected in Houston and Winona Counties (approximately 90 samples).

Over the last six months the following Minnesota Hydrogeological Atlas (MHA) reports and data were completed and made available to the public: HG-01 Pollution Sensitivity of the Bedrock Surface (http://www.dnr.state.mn.us/waters/programs/gw_section/mapping/platesum/mha_ps-bs.html); HG-02 Pollution Sensitivity of the Near-Surface Materials

(http://www.dnr.state.mn.us/waters/programs/gw_section/mapping/platesum/mha_ps-ns.html); HG-03 Water-table Elevation and Depth to Water-table (http://www.dnr.state.mn.us/waters/programs/gw_section/mapping/platesum/mha_wt.html); GW-03 Methods to Estimate Near-Surface Pollution Sensitivity (http://www.dnr.state.mn.us/waters/groundwater_section/mapping/resource.html); GW-04 Methods for Estimating water-table elevation and depth to water table.

The preliminary karst hydrologic unit map for Houston County has been refined; unit boundaries have been edited and the mapping process has been described. The methodology used for Houston County were applied to Winona County; a preliminary map of Winona has been created and unit boundary editing has begun. Spring hydrology investigations in both counties are continuing. A dual dye trace was run in Fillmore County in cooperation with the Fillmore SWCD and MDA. Those traces refined the boundaries of four previously mapped springsheds.

Amendment Request July 18, 2016. Approved July 19, 2016

We request the following budget changes:

Activity 1: An increase in the salary budget for Activity 1 and decreases in the professional and technical services, travel expense, and other budgets to more closely anticipate actual spending for the final year of this appropriation.

Activity 2: Decreases in travel expense, and equipment/tools/supplies to more closely anticipate actual spending for the final year of this appropriation. We are also asking for an increase in the professional and technical services budget (\$7,716) to fund part of an amended University of Minnesota work plan that includes a task to re-evaluate (re-interpret) groundwater residence time estimates from carbon-14 isotope sampling using modern modeling techniques and reviewing the entire statewide dataset. All available carbon-14 samples from groundwater collected for the DNR, the Minnesota Geological Survey and the University of Minnesota Earth Sciences Department will be reevaluated. In addition, the existing, unpublished methods document entitled "*Carbon-14 Age Dating Calculations for Minnesota Ground Waters*" will be updated and rewritten to be more widely useable. Carbon-14 age dating of selected samples is a standard part of Part B CGAs that help citizens understand the very limited recharge capacity of many Minnesota aquifers, thereby encouraging conservation and wise use. Creating consistent statewide Carbon-14 interpretations is compatible with the statewide and seamless mapping goals of this activity.

Activity 3: Decreases in travel expense, and equipment/tools/supplies to more closely anticipate actual spending for the final year of this appropriation.

Project Status as of February 22, 2017 [status and budget update as of February 15, 2017]:

All three Minnesota Hydrogeologic Atlases including: Pollution sensitivity of bedrock surface (HG-01), near-surface (HG-02), and water table elevation and depth (HG-03) were printed and delivered to interested parties.

Part B county geologic atlases for Nicollet, Sibley, Anoka and Renville were assembled and edited into draft and final formats.

The Nicollet, Sibley, and Anoka atlases were completed, printed and made available online. Workshops for these three atlases and Blue Earth were organized and presented to county and other local staff in December 2016 (Anoka) and February, 2017 (Nicollet, Sibley, and Blue Earth).

Most of the data analysis and mapping were completed for the Sherburne and Clay county atlases. Plans have been initiated for sampling Washington County in 2017.

Requested budget item decreases:

Activities 1, 2 and 3: The policy for charging the Environmental Trust fund for “direct and necessary” costs has changed so the budget amounts for each activity have been reduced accordingly. The requested budget amendment for this item is a decrease of \$29,485. We have also included a requested decrease for the travel budget item of \$2,760. The costs for this budget item will be covered by other funding.

Requested budget item increases:

Activity 1: Increases have been requested for budget items “personnel” -- \$28,003, “printing” -- \$2,367, and “other” -- \$1,875, to balance the funds that were not used for “direct and necessary” for all of the activities. The additional personnel funding will help cover the costs for report preparation for the Sherburne and Clay CGAs, and preparation for field sampling for the Washington CGA. The additional printing funds will be used to cover some of the costs of printing the Blue Earth CGA. The additional other funds will be used to pay for some of the water level data acquisition costs of the Winona CGA.

Overall Project Outcomes and Results

The County Geologic Atlas and Special Projects unit provides information about groundwater to help citizens and organizations improve sustainable management of groundwater resources. Delineated and mapped aquifers, recharge areas, and springsheds are essential information to help guide management decisions.

The County Geologic Atlas (CGA) Part B describes the hydrogeologic setting, water levels, chemistry, pollution sensitivity, and groundwater use in a county. It includes selected hydrogeologic cross sections indicating groundwater flow direction, residence time within aquifers and groundwater-surface water interactions. Completed counties that were partially funded by this project include Chisago, Nicollet, Sibley, Blue Earth, and Anoka. Also partially funded by this project, with plans to complete after June 30, 2017, are Renville, Clay, Sherburne, Wright, Houston, Winona, Morrison, and Meeker counties.

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IV. PROJECT ACTIVITIES AND OUTCOMES:

ACTIVITY 1: County Geologic Atlas, Part B

Description: Building on Part A atlas data, compile field chemistry, analyze groundwater samples for natural chemistry and age-dating isotopes, and assemble aquifer characteristics data. Prepare groundwater maps, cross sections, and interpretations of pollution sensitivity for publication in completed Part B atlas reports. Continue or begin new Part B projects.

Summary Budget Information for Activity 1:

ENRTF Budget: \$ 910,166
Amount Spent: \$ 910,166
Balance: \$ 0

Activity 1 Completion Date: June 30, 2017

Outcome	Completion Date	Budget
<p>1. Publish completed Part B reports (up to two): Publish reports underway at the start of the project period, including Blue Earth, Chisago, Nicollet, or Sibley; continue Part B projects (up to four), including, Anoka, Wright, Renville, and Clay; if possible start new Part B projects (up to two): Sherburne, Morrison, Olmsted and Meeker if possible. Includes contract services for laboratory analysis of water samples.</p> <p>Part B Atlas program personnel supported by the General Fund base program may be assigned to one or more of these projects or may work on specific components of projects so funds from both General Fund and ENTRF will be used to complete these atlases.</p>	June 30, 2017	\$910,166

Amendment Request September 11, 2013, Amendment

Approved September 17, 2013:

This amendment request is being submitted concurrently and in coordination with a related amendment request for the M.L. 2011, First Special Session, Chp. 2, Art.3, Sec. 2, Subd. 03b2 County Geologic Atlases for Sustainable Water Management project.

During the final year of the related M.L.2011 County Geologic Atlas project, planned groundwater sampling will take place April through June 2014. The samples collected will include tritium isotope samples. The laboratory requires up to three months to complete analysis of these samples and report the results. Therefore, the analyses and reporting is not expected to be completed under that project. To resolve this, the amendment request for the related M.L. 2011 atlas project requests that laboratory expense be reduced \$83,000 and personnel salary be increased \$83,000. Concurrently, this amendment requests increasing the laboratory budget \$83,000 and decreasing the personnel salary \$83,000. In these concurrent amendment requests, the timing of the expected laboratory expense for the samples is addressed, the overall budget of each project is not changed, and the laboratory budget and personnel budget of the combined 2011 and 2013 projects is not changed.

Activity Status as of February 25, 2014 [budget update as of December 31, 2013]:

Limited activity completed this reporting period. The planned contracts with chemistry and isotope analysis laboratories for this activity were executed. Related work in support of county geologic atlases has proceeded this report period with funding from the M.L. 2013 Clean Water appropriation for atlas completion and in support of this activity.

Activity Status Date December 26, 2014 (Work Plan update for July 15, 2014) [budget update as of June 30, 2014]:

Limited activity completed this reporting period. The planned contracts with chemistry and isotope analysis laboratories for this activity are in place. Related work in support of county geologic atlas completion has proceeded this report period with funding from M.L. 2011, First Special Session, Chp. 2, Art. 3, Sec. 2, 03b2,

'County Geologic Atlases for Sustainable Water Management' from the M.L. 2013 Clean Water appropriation for atlas completion.

Activity Status as of January 20, 2015 [budget update as of December 31, 2014]:

Work continued this reporting period under this ENRTF funding, including report technical development of the Blue Earth and Anoka Part B atlases, technical project direction, and editing and cartography. The Blue Earth Part B atlas is in a new booklet design which will include three smaller fold-in plates. The draft is in final draft form and will be sent for peer review next review period. The new report design is more complete (both maps and explanation) than was previously possible using only three or four plates. Related work in support of county geologic atlas completion also continued using other ENRTF funding (LCCMR 2011, County Geologic Atlas) or Clean Water appropriation for atlas completion. That related work included primarily technical development of the Nicollet, Sibley, Sherburne, Wright, and Renville atlases. Groundwater sample collection for two new county atlas projects, Wright and Renville was completed and samples submitted for laboratory analysis.

Activity Status as of January 22, 2016 [status and budget update as of July 15, 2015]:

Work continued this reporting period under this ENRTF funding, including printing the Chisago County Geologic Atlas Part B, report technical development of the Blue Earth, Anoka, Nicollet, Sibley, Renville, Clay, Wright, Part B atlases, technical project direction, and editing and cartography. The Blue Earth report was peer reviewed, the Anoka report continues in preparation, major technical analysis was completed for the Nicollet and Sibley atlases, staff assisted each other on Sherburne, Clay, Renville, and other projects. Staff also assisted development of technical documents for Activity 2. Staff continued revision or development of GIS tools to make more efficient certain GIS analyses or provide needed tools for project analysis. Related work in support of county geologic atlas completion also continued using other ENRTF funding (LCCMR 2011, County Geologic Atlas) or Clean Water appropriation for atlas completion. That related work included primarily technical development of the Nicollet, Sibley, Sherburne, Wright, and Renville atlases. Groundwater sample collection for a new county atlas project, Clay County, was completed and samples submitted for laboratory analysis. Carbon-14 samples at 10 sites each in Wright and Sherburne counties were collected and submitted for analysis.

This reporting period included considerable work on updating the DNR web pages for the County Geologic Atlas. The web page design was revised, improved access to data devised, and completed and updated data added to the site.

Activity Status as of February 29, 2016 [status and budget update as of January 15, 2016]:

All of the Anoka county geologic atlas (CGA) draft text and graphics were completed and most of the Sherburne graphics were completed. Major graphic elements for both atlases included: hydrogeologic cross sections; potentiometric surfaces/groundwater flow directions of buried sand and bedrock aquifers; pollution sensitivity maps and groundwater residence time comparisons; maps of selected chemical constituents (chloride, nitrates and arsenic) in groundwater; selected well hydrograph comparisons; distribution of stable isotope data (oxygen and hydrogen) in groundwater to determine locations of evaporative signature water from lakes; and groundwater use maps and tables.

Pollution Sensitivity of the Bedrock Surface (HG-01) was published in October 2015. A second version is expected to be published in February 2016 due to updates in the methodology for 4 counties. Pollution Sensitivity of Near-surface Materials (HG-02) is currently being finalized before heading into review in early 2016. Water-table Elevation and Depth (HG-03) was completed and is currently in review. A preliminary karst hydrologic landscape unit map was developed for Houston County to be included in the Houston (CGA).

Activity Status as of July 18, 2016 [status and budget update as of July 11, 2016]:

The Blue Earth County Geologic Atlas, Part B was completed, printed, and data were made available online. An internal draft of the Nicollet County atlas was completed. Publication of the Nicollet CGA, Part B is expected during the summer of 2016 followed soon after by the Sibley CGA, Part B. Significant progress was made creating and modifying hydrogeological cross sections and maps for the Anoka, Renville, Wright, Sherburne and Clay atlases. Ten carbon-14 samples were collected at selected wells in Clay County. General chemistry, trace constituent and tritium samples were collected in Houston and Winona Counties (approximately 90 samples).

Completed “Procedure for determining buried aquifer and bedrock surface pollution sensitivity based on cumulative fine-grained sediment (CFGs) thickness, Procedure GW-02.” This document was posted on our website (http://www.dnr.state.mn.us/waters/groundwater_section/mapping/resource.html).

Activity Status as of February 22, 2017 [status and budget update as of February 15, 2017]:

The Nicollet, Sibley, and Anoka atlases were completed, printed and made available online. Workshops for these three atlases and Blue Earth were organized and presented to county and other local staff in December 2016 (Anoka) and February, 2017 (Nicollet, Sibley, and Blue Earth).

Approximately 300 groundwater samples were collected during this reporting period for Houston, Morrison and Meeker counties. Most of the data analysis and mapping were completed for the Sherburne and Clay county atlases. Plans have been initiated for sampling Washington County in 2017.

Final Report Summary:

The CGA reports describe the hydrogeologic setting, water levels, chemistry, pollution sensitivity, and use of aquifers within the counties and include selected hydrogeologic cross sections to indicate groundwater flow directions and residence time within the buried sand and gravel aquifers and bedrock aquifers. Completed CGAs which were partially funded by this project included Part B atlases for Chisago, Nicollet, Sibley, Blue Earth, and Anoka. Other CGA projects assisted by this funding, but not completed by June 30, 2017 include: the counties of Renville, Clay, Sherburne, Wright, Houston, Winona, Morrison, and Meeker.

http://www.dnr.state.mn.us/waters/groundwater_section/mapping/status.html

ACTIVITY 2: Initiate Assembly of Published County Geologic Atlas, Part B, Geospatial Data (Minnesota Hydrogeologic Atlas – MHA)

Description: Construct necessary County Geologic Atlas, Part B geospatial data definitions and protocols needed to digitally assemble previously published groundwater maps and implement the data protocols for future projects. If possible, begin data assembly of priority data onto geospatial data layers in multiple formats.

Summary Budget Information for Activity 2:

ENRTF Budget: \$118,544
Amount Spent: \$118,544
Balance: \$ 0

Activity Completion Date: June 30, 2016

Outcome	Completion Date	Budget
1. Construct groundwater geospatial data protocols; implement for future projects. If possible, begin assembly of geospatial data layers. Includes contract services with Minnesota Geological Services for assembly and/or interpretation of legacy aquifer or groundwater data previously published by the MGS.	June 30, 2016	\$118,544

Activity Status as of February 25, 2014 [budget update as of December 31, 2013]:

Limited activity completed this reporting period. The planned hire for this activity was not completed. Hiring this position will be a priority for the next reporting period. The contract with the Minnesota Geological Survey for assistance with atlas legacy data for this activity was executed.

Activity Status Date December 26, 2014 (Work Plan update for July 15, 2014) [budget update as of June 30, 2014]:

Limited activity completed this reporting period. The planned hire for this activity was not completed. Hiring this position will be a priority for the next reporting period. The contract with the Minnesota Geological Survey for assistance with atlas legacy data for this activity was in place. Note that the planned hire for this Activity was accomplished December 2014 and will be report in the next Activity Status Report.

Activity Status as of January 20, 2015 [budget update as of December 31, 2014]:

The planned hire for this Activity was accomplished December 2014. The person hired (Roberta Adams) previously worked at the Minnesota Geological Survey on a similar contract project for another state agency. Prior to Roberta starting, a project Technical Advisory Team was assembled and met several times to review priorities. Initial work began on assembling data for a statewide layer interpreting near-surface pollution sensitivity. This work also included expanding existing description of procedures for this layer for application to current and future atlas projects so all atlas data for this interpretive theme are prepared consistently. This work also included beginning to develop or revise GIS data structures and definitions for the next priority data theme, which will be the water table elevation data layer.

Status as of January 22, 2016 [status and budget update as of July 15, 2015]:

After discussions with the Technical Advisory Team, four initial map layers were determined for the state wide map series: near-surface pollution sensitivity, pollution sensitivity of the bedrock surface, water table elevation, and water table depth. The name of the series is the Minnesota Hydrogeology Atlas (MHA). The series is created in such a way as to update previous map products to current standards, create standard internal procedures, and advance the county atlas program while creating state wide layers.

Over the past six months, work was done with assistance from the Minnesota Geological Survey (MGS) to create a texture database for surficial geologic units in Minnesota for use by both agencies. The database was used to provide a better representation of the near-surface pollution sensitivity of Minnesota for the purposes of this project. In addition to the database creation, additional scientific literature research and agency consultations were completed to help characterize distinctive hydrogeologic regions of the state dominated by karst and extensive lake sediments. A draft of this near-surface pollution sensitivity map is nearly complete for internal review.

Eighteen counties with various versions of bedrock aquifer pollution sensitivity maps were compiled and modified to show the top of bedrock surface pollution sensitivity across completed atlas areas. This map is in the production phase.

Compilation of the water table elevation and water table depth maps is in progress. Approximately half the state has been completed.

New procedures for map creation have been developed and applied Part B atlases in progress, as well as incorporated into the MHA series. Updates to the DNR Groundwater webpage have also been made to reflect the new series and its relationship to the existing and on-going CGA series.

Activity status as of February 29, 2016 [status and budget update as of January 15, 2016]:

Pollution Sensitivity of the Bedrock Surface (HG-01) was published in October 2015. A second version is expected to be published in February 2016 due to updates in the methodology for 4 counties. This publication includes 19 counties.

Water-table Elevation and Depth (HG-03) was completed and is currently in review. It includes a state wide water-table elevation map and a statewide depth to water-table map, as well as a report to explain procedure and usage. Expected publication is early 2016.

Pollution Sensitivity of Near-surface Materials (HG-02) is currently being finalized before heading into review in early 2016. This is a statewide coverage of the pollution sensitivity of the materials within 10 feet of the surface. Over the past six months, the texture database for surficial geological units in published and unpublished MGS maps, for the purpose of a more robust model of the near surface pollution sensitivity, was finalized in November 2015 by both the MGS and DNR.

Addressing concerns from LCCMR board members with regards to sensitivity representations in SE Minnesota, the Minnesota Regions Prone to Surface Karst Feature Development (GW-01) is an update to previous work done by Calvin E. Alexander in 2006. Originally created for use within the Pollution Sensitivity of Near-surface Materials (HG-02), GW-01 is available for the whole state where there is karst susceptibility with 50 feet of the surface, and was published in December 2015.

Internal procedures for water-table elevation and depth, near surface pollution sensitivity, and bedrock surface pollution sensitivity, as applicable to both CGA and MHA , are currently in review. Procedures will be available to the public in early 2016.

Activity Status as of July 15, 2016 [status and budget update as of July 1, 2016]:

This activity has been completed.

Activity Status as of February 22, 2017 [status and budget update as of February 15, 2017]:

This activity has been completed.

Final Report Summary:

Statewide MHA thematic maps are a compilation of information that was previously only available in the county format. Users of these maps sometimes prefer to have this information available without the county boundary limitations for multi-county or watershed evaluations. The following products were completed and made available to the public:

- HG-01 Pollution Sensitivity of the Bedrock Surface report, plate, and digital data
- HG-02 Pollution Sensitivity of the Near-Surface Materials, report, plate, and digital data
- HG-03 Water-table Elevation and Depth to Water-table, report, 2 plates, and digital data
- GW-01 Minnesota Regions Prone to Surface Karst Feature Development, report, plate, and digital data
- GW-03 Methods to Estimate Near-Surface Pollution Sensitivity, a procedure document
- GW-04 Methods for Estimating water-table elevation and depth to water table. This is a procedure document to be used as a guide for updating MHA products as part of future CGA publications.

ACTIVITY 3: Springshed Mapping Continuation and Draft Karst Plates for Two Atlases

Description: Continue springshed mapping to focus on Winona and Houston counties and if possible include priority locations within the Galena karst of Fillmore County. The mapping will be combined with karst feature mapping and landscape analysis to produce karst-landscape and hydrology maps for Part B of the Winona and Houston atlases, to be published as part of the completed Part B reports.

Summary Budget Information for Activity 3:

ENRTF Budget: \$171,240

Amount Spent: \$171,240

Balance: \$ 0

Activity 3 Completion Date: June 30, 2014

Outcome	Completion Date	Budget*
1. 1:100,000 or smaller scale maps of delineated springsheds	June 30, 2014	\$ 33,000
2. Maps and reports of completed dye traces; includes contract services for traces, lab services, and database support	June 30, 2014	\$ 100,000
3. Initial development of karst plates for Winona and Houston county geologic atlases, Part B	June 30, 2014	\$ 38,240

* Estimated amount per Outcome task; amounts may vary per task but total activity budget will not exceed the budget of \$ 171,240.

Activity Status as of February 25, 2014 [budget update as of December 31, 2013]:

No activity completed this reporting period under this funding. The contract with the Minnesota Geological Survey for assistance with the Karst Features Database and related technical assistance in support of this activity was executed. Work in Houston and Winona counties has proceeded this report period with ENRTF funding for county geologic atlases M.L. 2011, First Special Session, Chp. 2, Art. 3, Sec. 2, 03b2, 'County Geologic Atlases for Sustainable Water Management'. Refer to the work plan update for that project for details. Related work in support of the Houston and Winona atlases has proceeded with funding from the M.L. 2013 Clean Water appropriation for atlas completion and in support of this activity.

Activity Status Date December 26, 2014 (Work Plan update for July 15, 2014) [budget update as of June 30, 2014]:

Limited activity completed this reporting period under this funding. The contract with the Minnesota Geological Survey provided assistance with the Karst Features Database to improve the design, content, and access of the database and related technical assistance in support of this activity. Limited work in Houston and Winona counties has proceeded this report period with ENRTF funding for county geologic atlases M.L. 2011, First Special Session, Chp. 2, Art. 3, Sec. 2, 03b2, 'County Geologic Atlases for Sustainable Water Management'. Refer to the work plan update for that project for details. Additional related work in support of the Houston and Winona atlases has proceeded with funding from the M.L. 2013 Clean Water appropriation for atlas completion and in support of this activity.

Activity Status as of January 20, 2015 [budget update as of December 31, 2014]:

A dye trace was conducted at Stockton in Winona County. Work included updating the springshed data and associated GIS data. Field mapping was conducted of geologic and related karst features for the Winona/Houston Karst Landscape Unit Map that will be included in the Winona and Houston atlas Part B report. Activity staff participated in a joint field trip with Minnesota Geological Survey staff to study in detail karst features of specific geologic units to better understand and more accurately describe and map Karst Landscape Units.

Activity status as of January 22, 2016 [status and budget update as of July 15, 2015]:

Field work was done to conclude the Stockton dye trace in Winona County. This dual dye trace identified two new springsheds in the St. Lawrence and Lone Rock Formations. Significant progress was made on the Houston County Karst Landscape Unit map, including unit analysis, delineation, naming, and description. With separate funding from DNR-Fisheries for laboratory analysis, thirty-eight springs in Houston and Winona counties were sampled for general water chemistry. These data will be used to further refine the Karst Landscape Unit map. Two dual dye traces were run in the Galena karst of Olmsted County in cooperation with the Olmsted SWCD. These traces resulted in the identification of three new springsheds.

Activity status as of February 29, 2016 [status and budget update as of January 15, 2016]:

A preliminary karst hydrologic landscape unit map was developed for Houston County. The karst hydrologic landscape units are based on their geology (bedrock unit), morphology (slope & degree of dissection), hydrogeologic characteristics (aquifer nature), karst hydrologic characteristics as determined by fluorescent dye tracing including springshed mapping, spring monitoring, and geochemistry and karst feature type and occurrence. These elements are combined in a GIS environment and then the unit boundaries are iteratively determined using GIS analysis and field mapping. The map has six primary units that are then subdivided based on local geography. The unit delineation methods were developed using GIS technology in order for them to be used in Winona County and in other counties.

Project Status as of July 15, 2016 [status and budget update as of July 11, 2016]:

The preliminary karst hydrologic unit map for Houston County has been refined; unit boundaries have been edited and the mapping process has been described. The methodology used for Houston County were applied to Winona County; a preliminary map of Winona has been created and unit boundary editing has begun. Spring hydrology investigations in both counties are continuing. A dual dye trace was run in Fillmore County in cooperation with the Fillmore SWCD and MDA. Those traces refined the boundaries of four previously mapped springsheds.

Project Status as of February 22, 2017 [status and budget update as of February 15, 2017]:

This activity has been completed.

Final Report Summary:

Partial funding was also provided for mapping springsheds in southeastern Minnesota. Springshed delineation involves determining the size and nature of the land area that contributes to groundwater and spring discharge. Springshed delineation is conducted by pouring fluorescent dye into sinkholes or sinking streams and monitoring possible resurgences at nearby springs. This area can encompass both a contributing surface watershed and an underlying groundwatershed. Understanding the extent of springsheds is important for the protection of the numerous trout fisheries in southeastern Minnesota. As a result of this funding, over 100 dye trace reports and related information are now available at:

http://www.dnr.state.mn.us/waters/programs/gw_section/springs/dtr-list.html.

V. DISSEMINATION:

Description:

Activity 1 and 2, County Geologic Atlas -- Each county geologic atlas, Part B completed is printed in paper format distributed to county, libraries, state agencies, and other organizations. They are available for sale at the MGS. PDF versions of the report are posted to the DNR web site and are available through

http://www.dnr.state.mn.us/waters/groundwater_section/mapping/status.html . Project data, including water chemistry data and GIS data are also posted to the DNR web site. Following publication of each Part B report, a local workshop is held to introduce the report content and train users in its application.

Activity 3, Springshed mapping and draft karst plates -- GIS-based maps and written reports of the springsheds will be prepared and disseminated to the LCCMR, interested residents and to local, regional and state resource managers and regulators interested in specific targeted areas. Interim dye trace results will be available as GIS shape files and derived products on a dye trace by dye trace basis. Data tables of discharge and chemistry will be available as developed. The draft karst plates for Winona and Houston counties will be published with the respective Part B reports.

Status as of February 25, 2014 [budget update as of December 31, 2013]:

No activity completed this reporting period under this funding. Work to disseminate project reports and data in Activities 1, 2, and 3 have proceeded with funding for this report period with Clean Water appropriation for atlas completion and in support of this activity. Specific activities to disseminate reports and data included atlas workshops for Carver and McLeod counties, assistance to Chisago County staff, updating DNR web pages with the completed McLeod atlas report and data. Project hydrologists have prepared and presented talks for a variety of audiences, including DNR staff, local county staff, and professional staff in other organizations. In the course of project work, project staff have continued and developed contacts with technical specialists both locally and nationally, in some cases internationally. Reports and data have been distributed to these specialists and others as requested.

Status Date December 26, 2014 (Work Plan update for July 15, 2014) [budget update as of June 30, 2014]:

Limited activity completed this reporting period under this funding. Work to disseminate project reports and data in Activities 1, 2, and 3 have proceeded with funding for this report period with Clean Water appropriation for atlas completion. Specific activities to disseminate reports and data included updating DNR web pages with current information of completed projects.

Status as of January 20, 2015 [budget update as of December 31, 2014]:

An internal DNR newsletter article on the completed LCCMR 2011 springshed mapping project was prepared and distributed to DNR staff in October. The springshed map from the project is available on the DNR website at http://www.dnr.state.mn.us/waters/groundwater_section/pilot/springshed.html . The web page provides a link to the completed Springshed Assessment Protocols that will be used as an ongoing reference. Several talks on SE MN karst, including the springshed mapping work, were presented to local government meetings in October. Project web pages were updated.

Status as of January 22, 2016 [status and budget update as of July 15, 2015]:

[Activity 1] This reporting period included considerable work on updating the DNR web pages for the County Geologic Atlas. Web pages design were revised, improved access to data devised, and completed and updated data added to the site. Staff assisted development and delivery of SWCD training sessions that included Atlas content. Staff regularly responds to both internal and external requests for assistance accessing Atlas data.

[Activity 2] Updates to the DNR Groundwater webpage have also been made to reflect the new series and its relationship to the existing and on-going CGA series.

[Activity 3] Staff from the DNR MN Conservation Volunteer magazine made two field visits to gather material for an upcoming story in the magazine about the springshed mapping work. The results of dye tracing and

springshed mapping work in the Lone Rock Formation were presented at the Driftless Area symposium in La Crosse, WI in February.

Status as of February 29, 2016 [status and budget update as of July 15, 2015]:

The preliminary Houston County map was displayed at the 14th Sinkhole Conference in Rochester, MN to solicit input & feedback from other karst professionals. Springshed mapping and preliminary Minnesota Hydrologic Atlas (MHA) results were presented at the University of Minnesota Water Resources Seminar in September 2015. A general overview of the county geologic atlas program was also presented at this University of Minnesota conference and four Soil and Water Conservation District (SWCD) conferences at various locations in the state. A county geologic atlas pollution sensitivity procedure was finalized and posted on the website (buried sand aquifer and bedrock surface pollution sensitivity based on cumulative fine-grained sediment thickness). We finalized and posted the following on the website: Pollution Sensitivity of the Bedrock Surface (HG-01), and Minnesota Regions Prone to Surface Karst Feature Development.

Status as of July 15, 2016 [status and budget update as of July 1, 2016]:

DNR staff met with Blue Earth County, City of Mankato, and MDH staff to give them a brief overview of the atlas and answer general questions that they had about how the atlas could apply to their local issues. The Blue Earth County Geologic Atlas Part B was printed and copies were delivered to the county offices and the Minnesota Geological Survey for map sales.

The springshed work was the subject of a feature article in the March-April issue of the Minnesota Conservation Volunteer. The article emphasized the importance of land use management and the discovery that springs emanating from deep strata in the incised valleys of the Driftless Area can be connected to the land surface. The article is available on-line at:

<http://www.dnr.state.mn.us/mcvmagazine/issues/2016/mar-apr/springshed-mapping.html>

Project results and their applicability for aquifer recharge area identification were presented to the Bolivian Society of Engineers in Santa Cruz, Bolivia on 10 March 2016.

Status as of February 22, 2017 [status and budget update as of February 15, 2017]:

Jim Berg participated in three general groundwater education workshops to Soil and Water Conservation District (SWCD) training sessions in Duluth, Thief River, and St. Peter. The presentations contained many examples of county geologic atlas and Minnesota Hydrogeologic atlas products. The county and local staff workshops for Blue Earth, Anoka, Sibley and Nicollet were presented during this reporting period including distribution of paper copies and online documents and data.

Final Report Summary:

Activity 1 – County Geologic Atlas, Part B

Staff assisted development and delivery of training sessions at four Soil and Water Conservation District (SWCD) conferences at various locations in the state in 2015 that included CGA content.

A general overview of the CGA program was presented at this University of Minnesota Water Resources Conference in September 2015.

DNR staff met with Blue Earth County, City of Mankato, and MDH staff in 2016 to give them an overview of the atlas and answer general questions that they had about how the atlas could apply to their local issues. The Blue Earth County Geologic Atlas Part B was printed in 2016 and copies were delivered to the county offices and the Minnesota Geological Survey for map sales.

Jim Berg participated in three general groundwater education workshops to Soil and Water Conservation District (SWCD) training sessions in Duluth, Thief River, and St. Peter in 2016. The presentations contained many examples of county geologic atlas and Minnesota Hydrogeologic atlas products.

The county and local staff workshops for Anoka County (December 2016) and Blue Earth, Sibley and Nicollet counties (February 2017) were presented. These workshops included the distribution of paper copies.

An article comparing Anoka county CGA results to Sibley and Nicollet county results was published in the March 2017 MGWA newsletter.

Activity 2 – Minnesota Hydrogeologic Atlas

Springshed mapping and preliminary Minnesota Hydrologic Atlas (MHA) results were presented at the University of Minnesota Water Resources Conference in September 2015.

General groundwater education workshops to Soil and Water Conservation District (SWCD) training sessions in Duluth, Thief River, and St. Peter in 2016 contained many examples of Minnesota Hydrogeologic atlas products.

Activity 3 -- Springshed mapping: An internal DNR newsletter article on the completed LCCMR 2011 springshed mapping project was prepared and distributed to DNR staff in October 2014. The springshed map from the project is available on the DNR website at:

http://www.dnr.state.mn.us/waters/groundwater_section/pilot/springshed.html .

The web page provides a link to the completed Springshed Assessment Protocols that will be used as an ongoing reference.

Several talks on SE MN karst, including the springshed mapping work, were presented to local government meetings in October 2014.

Springshed mapping results were presented at the University of Minnesota Water Resources Conference in September 2015. A general overview of the county geologic atlas program was also presented at this University of Minnesota conference

Springshed mapping was the focus of two papers & presentations at the 14th Sinkhole Conference in Rochester, MN October 2015.

The results of dye tracing and springshed mapping work in the Lone Rock Formation were presented at the Driftless Area symposium in La Crosse, WI in February 2016.

The springshed work was the subject of a feature article in the March-April 2016 issue of the Minnesota Conservation Volunteer (circulation of 113,000). The article emphasized the importance of land use management and the discovery that springs emanating from deep strata in the incised valleys of the Driftless Area can be connected to the land surface. The article is available on-line at:

<http://www.dnr.state.mn.us/mcvmagazine/issues/2016/mar-apr/springshed-mapping.html>

The springshed mapping work was presented to the Friends of the Root River citizen group in Spring Valley, MN November 2016, the Red Wing, MN Audubon chapter January 2017 and at the Smithsonian Waterways display in Lanesboro, MN January 2017.

The Nature Conservancy filmed a video on karst, springs and water quality at Seven Springs WMA in Fillmore County in June 2017. DNR staff discussed dye tracing and springshed mapping as important tools to understanding, managing and protecting springs.

VI. PROJECT BUDGET SUMMARY:

A. ENRTF Budget: See also project Attachment A Budget Detail

Budget Category	\$ Amount	Explanation
Personnel:	\$785,770	<p>10 positions, 9.5 FTE for direct project activities. One-year funding for FY14, all are state employees with fringe benefits approx. 21% to 37% per state union contract. Most positions require specialized professional skills in hydrogeology and groundwater systems, including sampling design, sample collection and interpretation, geospatial analysis, data management, and report preparation. Staff skills focused on report development and communication of results are needed this project period to meet deadlines for published and web-based products.</p> <p>Hydrologist Supervisor: est. \$52,000 (1 classified @ 0.5 FTE) Research Scientist 3: est. \$98,000 (1 classified @ 1.0 FTE) Hydrologists: est. \$167,953 (2 unclassified or classified @ 1.0 FTE) Hydrologists: est. \$339,000 (4 classified @ 1.0 FTE) Information Officer: est. \$79,000 (1 unclassified or classified @ 1.0 FTE) Research Analyst: est. \$53,000 (1 unclassified @ 1.0 FTE)</p>
Professional/Technical/Service Contracts:	\$314,791	<p>Laboratory analysis of groundwater and dye trace samples; technical analysis of field and laboratory data; interpretation of isotope data; karst database support; assembly and/or interpretation of legacy aquifer or groundwater data previously published by the Minnesota Geological Survey. Sample plan for each Part B atlas is 100 chemistry/isotope groundwater samples at \$350 ea. and 10 carbon-14 samples at \$600 ea.</p>
Direct and necessary services for the appropriation**	\$49,732	Direct and necessary services for the appropriation
Equipment/Tools/Supplies:	\$19,948	Data collection equipment, tools, and supplies

		including expendable water sampling or necessary field work supplies. Where possible existing equipment from previous projects will be used. Includes computer fleet charges prorated for up to 9.5 FTE paid through this appropriation (est. \$8,602, about \$500/year/FTE/computer). Field positions require field-use computers in addition to office-based computers.
Capital Expenditures over \$3,500:	\$0	None planned.
Printing:	\$22,367	Each Part B report includes 4 map plates per atlas (approx. 30 x 30 inches), 1,200 sheets per plate, 4,800 sheets per atlas.
Travel Expenses in MN:	\$4,163	Necessary travel for water sample collection, dye traces, collaboration with project partners, project results dissemination; mileage, lodging, meals.
Other: report production software; GIS and field computers; GIS training; water sample shipping:	\$3,179	Report production software licenses and software upgrades (Adobe Acrobat, Illustrator, Photoshop, InDesign; Avenza Map Publisher). Includes a new Adobe Creative Suite license for the Research Scientist 3 (approx.\$2,000). Software upgrades (approx. \$200 to 500 per license) must be purchased periodically to avoid lapse of active licenses. Report production software licenses and upgrades are the responsibility of the work unit. New atlas project staff requires specialized computers capable of advanced GIS operations and training; a ruggedized field computer will withstand water, dirt, and temperature extremes encountered in field conditions; water samples must be shipped to laboratory.
TOTAL ENRTF BUDGET:	\$1,200,000	

* Estimated amount per budget category; amounts may vary per category but total project budget will not exceed the Total ENRTF budget of \$ 1,200,000.

** Direct and Necessary expenses include both Department Support Services (Human Resources, IT, Financial Management, Communications, Procurement, and Facilities) and Division Support Services. Department Support Services are described in agency Service Level Agreements, and billed internally to divisions based on indices that have been developed for each area of service. Department leadership (Commissioner’s Office and Regional Directors) are not assessed. Division Support Services include costs associated with Division and regional leadership, business offices, and clerical support. Those elements of individual projects that put little or no demand on support services such as large single-source contracts, large land acquisitions, and funds that are passed-thru to other entities are not assessed Direct and Necessary costs for those activities. For this work plan, single-source contracting activity with an associated cost of \$244,500 has not been assessed Direct and Necessary costs.”

Explanation of Use of Classified Staff:

Any classified position paid for with ENRTF funds will either be 1) backfilled with a new position or 2) the work previously done by this position will be delayed, eliminated, or completed by the start of the project. In anticipation of this work continuing into the future, new positions in this project will be created as classified due to the experienced difficulty in attracting high-quality candidates to fill the unclassified positions. The personnel plan in this work plan is modified to accommodate the option of hiring either unclassified or classified staff for two existing hydrologist 2 positions and the information officer position. The three positions were originally created as unclassified positions. Allowing the option of reclassifying one or more of the positions as classified when a position vacancy occurs provides the most flexibility in hiring high-quality candidates who might not otherwise apply to a limited unclassified position.

There is one classified position currently working on this project to be paid partially by this grant. The hydrologist supervisor provides overall atlas program direction, on-going program management, and is the technical supervisor for staff assigned to specific atlas projects or who support the atlas program as GIS or report production specialists. A portion of the hydrologist supervisor’s time (0.5 FTE) will be paid by this grant and the remaining portion will be paid by General Fund, subject to an approved DNR budget.

Explanation of Capital Expenditures Greater Than \$3,500: none planned

Number of Full-time Equivalent (FTE) funded with this ENRTF appropriation: 9.5 FTE

Number of Full-time Equivalent (FTE) estimated to be funded through contracts with this ENRTF appropriation: NA

B. Other Funds:

Source of Funds	\$ Amount Proposed	\$ Amount Spent	Use of Other Funds
Non-state			
In-kind Services During Project Period: County assistance to arrange sampling access and sponsor local training workshop	\$5,000	\$	County assists staff in local access to well owners and sponsors the training workshop at the conclusion of the project.
State			
Other State \$ Being Applied to Project During Project Period: General Fund <u>base program support</u> , estimated \$410,000 for the FY14 one-year project period to complete one, continue several, and possibly initiate an additional Part B atlas. Clean Water Fund, M.L. 2009 Ch 172 Art 2 Sec 5(f), July 1, 2009 thru December 31, 2014; estimated \$100,000 of CWF appropriation will be used during FY14 project period. Clean Water Fund, M.L. 2013 Ch 137 Art 2 Sec 6 (h), \$1,230,000 July 1, 2013 thru June 30, 2015.	\$1,740,000	\$	General Fund base program support provides personnel, laboratory analysis and interpretation, printing, travel expenses, water sampling equipment and supplies, and related expenses. Clean Water Funds primarily intended to expand and improve subsurface data acquisition in support of atlases. Clean Water Funds specifically to support the completion of county geologic atlases

Remaining from current ENRTF appropriation: Atlas -- M.L. 2011, 1st Sp. Session, Ch. 2, Art. 3, Sec. 2, Subd. 03b2, (\$385,396 unspent as of January 15, 2013); Springshed -- M.L. 2011, 1st Sp. Session, Ch. 2, Art. 3, Sect. 2, Subd. 5(b)-LCCMR-Springshed Phase III July 1, 2011 (\$78,533 unspent as of January 15, 2013)	\$463,929	\$	Personnel, laboratory analysis and interpretation, printing, travel expenses, water sampling equipment and supplies, and related expenses. The Atlas M.L. 2011 springshed M.L. 2011 grants are fully budgeted for FY13, and not available for use in the current work plan for FY14. Any unused project funds at the end of FY13 will carry into FY14 and will be utilized directly to support project work and described in the updates due July 15, 2013 and January 15, 2014.
TOTAL OTHER FUNDS:	\$2,208,929	\$	

VII. PROJECT STRATEGY:

See also Minnesota Geologic Survey County Geologic Atlas, Part A, Work Plan submitted separately to LCCMR.

A. Project Team/Partners:

The Minnesota Geological Survey completes Part A of county geologic atlases (see MGS Main proposal for county atlas continuation). To determine priority, the MGS requires that the counties participate either with funding or with in-kind services and also considers groundwater sensitivity, resource demand, and the size of the population served. At the completion of the Part A work, DNR completes Part B, the groundwater portion, of the atlases. DNR requests local government sponsorship for training workshops intended for local staff and the public held at the completion of a Part B atlas. Project partners for the springshed mapping work will include the MGS, Dr. Calvin Alexander (University of Minnesota Dept. Earth Science) and the Root River partnership.

B. Project Impact and Long-term Strategy:

The County Geologic Atlas program is the primary vehicle to provide comprehensive geologic mapping and associated databases at appropriate scales statewide. The MGS receives funding from DNR and also leverages federal dollars from the National Cooperative Geologic Mapping Program of the USGS. The MGS competes annually for these federal cost-share dollars. MGS Part A atlas development is also supported by ENRTF and Clean Water Fund through direct appropriation. DNR is a cooperator and funding partner with the MGS. The Part B atlases are currently supported by a combination of state general fund, ENRTF, and Clean Water Fund appropriations to DNR. Springshed mapping and research to investigate and understand groundwater flow in complex geologic systems and has been ongoing in southeast Minnesota for many years; some of this work has been supported by ENRTF. While there has been significant progress in certain areas, such as Fillmore County, unmapped areas remain and future support will be needed to extend the mapped areas.

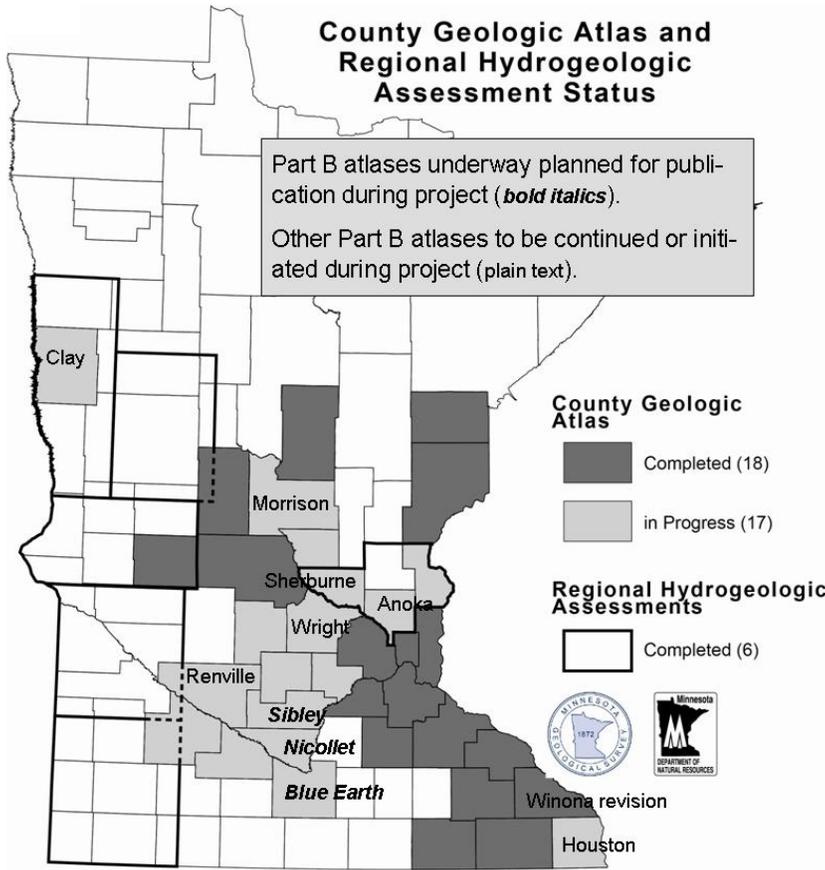
C. Spending History:

Funding Source	M.L. 2007 or FY08	M.L. 2008 or FY09	M.L. 2009 or FY10	M.L. 2010 or FY11	M.L. 2011 or FY12-13
ENRTF (FY9-11) to DNR. Total appropriation was \$1,600,000; a portion funded Phase 1 of the Mt. Simon aquifer investigation;		Subd. 4(h) \$861,000 Mt. Simon aquifer			

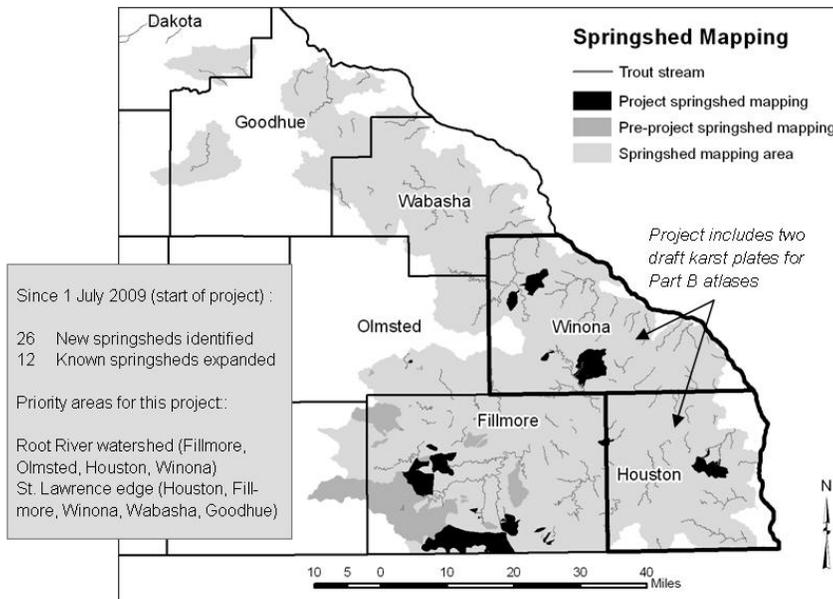
\$706,000 appropriated directly to MGS for atlas continuation					
(Part B atlas) ENRTF (FY10-12) to DNR. Total appropriation was \$2,695,000; a portion funded DNR county atlas continuation; a portion funded Phase 2 of the Mt. Simon aquifer investigation; \$820,000 appropriated directly to MGS for atlas continuation.			Subd. 3(b) \$890,000 county atlas continuation \$895,000 Mt. Simon aquifer.		
(Part B atlas) ENRTF (FY12-13) to DNR					\$600,000 Subd. 03b2
(Springshed mapping) ENRTF via contract with of MN	\$125,000				
(Springshed mapping) ENRTF DNR			\$250,000		
(Springshed mapping) ENRTF DNR					\$220,000 Subd. 05b1

VIII. ACQUISITION/RESTORATION LIST: N/A

IX. MAP(S):



Mar 2012 gm, jdf



LCCMR2013 MNDNR WorkPlan atlas/springshed cont

X. RESEARCH ADDENDUM: N/A

XI. REPORTING REQUIREMENTS:

Periodic work plan status update reports will be submitted not later than January 15, 2014, July 14, 2014, January 15, 2015, July 14, 2015, January 15, 2016, July 15, 2016, and January 15, 2017. A final report and associated products will be submitted between June 30 and August 15, 2017 as requested by the LCCMR.

Final Attachment A: Budget Detail for M.L. 2013 Environment and Natural Resources Trust Fund Projects											
Project Title: County Geologic Atlases (Part B) for Water Resource Sustainability											
Legal Citation: M.L. 2013, Chp. 52, Sec. 2, Subd. 03c and Carryforward: (a) The availability of the appropriations for the following projects are extended to June 30, 2017: (1) Laws 2013, chapter 52, section 2, subdivision 3, paragraph (c),											
County Geologic Atlases - Part B											
Project Manager:- Jim Berg											
M.L. 2013 ENRTF Appropriation: \$1,200,000											
Project Length and Completion Date: First year appropriation FY14, all deliverables to be completed by June 30, 2017 (four years)											
Date of Update: Final											
ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Activity 1 Budget (2/24/17)	Amount Spent	Balance	Activity 2 Budget (2/24/17)	Amount Spent	Balance	Activity 2 Budget (2/24/17)	Amount Spent	Balance	Total budget	TOTAL BALANCE
BUDGET ITEM	County Geologic Atlas, Part B										
Personnel (Wages and Benefits)	585,770	585,770	0	96,000	96,000	0	104,000	104,000	0	785,770	0
10 positions, 9.5 FTE for direct project activities. One-year funding for FY14, all are state employees with fringe benefits approx. 21% to 37% per state union contract. Most positions require specialized professional skills in hydrogeology and groundwater systems, including sampling design, sample collection and interpretation, geospatial analysis, data management, and report preparation. Staff skills focused on report development and communication of results are needed this project period to meet deadlines for published and web-based products.											
Hydrologist Supervisor: est. \$52,000 (1 classified @ 0.5 FTE)											
Research Scientist 3: est. \$98,000 (1 classified @ 1.0 FTE)											
Hydrologists: est. \$167,953 (2 unclassified or classified @ 1.0 FTE)											
Hydrologists: est. \$339,000 (4 classified @ 1.0 FTE)											
Information Officer: est. \$79,000 (1 unclassified or classified @ 1.0 FTE)											
Research Analyst: est. \$53,000 (1 unclassified @ 1.0 FTE)											
Professional/Technical/Service Contracts											
Act. 1: Laboratory analysis of water samples . State contract or University of Minnesota.	240,075	240,075	0							240,075	0
Act. 2: Interpretation of legacy geologic and groundwater data. Minnesota Geological Survey.				17,716	17,716	0				17,716	0
Act. 3: Springshed mapping technical, laboratory, and database. Minnesota Geological Survey and University of Minnesota.							57,000	57,000	0	57,000	0
Direct and Necessary Services for the Appropriation (79,216; distributed propor. activity budget)	37,283	37,283	0	4,822	4,822	0	7,627	7,627	0	49,732	0
Equipment/Tools/Supplies											
Act. 1: Atlas water sampling and measurement tools, field analytical meters and equipment, field safety equipment, est. \$8,953; water sampling and field supplies, including expendable sampling and testing supplies, est. \$8,000; Act. 3: Springshed mapping equipment and tools, est. \$2,076, water testing, tracing, and field supplies, including expendable field and testing supplies, est. \$1,200. This item includes computer fleet charges prorated for 9.5 FTE paid through this appropriation (est. \$8,602, about \$500/year/FTE/computer).	19,948	19,948	0	0	0	0	50	50	0	19,998	0
Capital expenditures over \$3,500 - none planned											
Printing											
Act. 1: Printing up to two completed atlas reports, est. \$10,000 ea. MinnCor state contract.	22,367	22,367	0							22,367	0
Travel expenses in Minnesota											
Fleet charges for cars, trucks, minivans, est. \$ 16,600; lodging, meals, mileage as per state contracts, est. \$ 9,500.	1,544	1,544	0	6	6	0	2,613	2,613	0	4,163	0
Other											
Act. 1: Report preparation and production software licenses and continued upgrades to assure efficient report preparation and publication, est. \$5,600; One (1) GIS workstation for new project hydrogeologist 2 hire and one (1) ruggedized field computer for new field hydrogeologist 1 hire, est. \$5,000; GIS training new hydrogeologist hires, est. \$800; Shipping costs for water samples to laboratory, est. \$1000.	3,179	3,179	0							3,179	0
COLUMN TOTAL	\$910,166	\$910,166	0	\$118,544	\$118,544	\$0	\$171,290	\$171,289	\$1	\$1,200,000	\$0