

**Environment and Natural Resources Trust Fund
2018 Request for Proposals (RFP)**

Project Title:

ENRTF ID: 001-A

Minnesota Geological Survey Geologic Atlases for Water Resource Management Part-A

Category: A. Foundational Natural Resource Data and Information

Total Project Budget: \$ 4,121,625

Proposed Project Time Period for the Funding Requested: 4 years, July 2018 to June 2022

Summary:

This project continues accelerated production of County Geologic Atlases to support informed management of water and mineral resources. This work is essential to sustainable management of water.

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Sponsoring Organization: U of MN - MN Geological Survey

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Location

Region: Statewide

County Name: Statewide

City / Township:

Alternate Text for Visual:

Current status of Part A Geologic Atlases

_____ Funding Priorities	_____ Multiple Benefits	_____ Outcomes	_____ Knowledge Base
_____ Extent of Impact	_____ Innovation	_____ Scientific/Tech Basis	_____ Urgency
_____ Capacity Readiness	_____ Leverage	_____ TOTAL	_____ %



PROJECT TITLE: Minnesota Geological Survey Geologic Atlases for Water Resource Management

I. PROJECT STATEMENT

Geologic atlases provide maps and databases essential for improved management of ground and surface water. This is foundational data that supports management of drinking water, domestic and industrial supply, irrigation, 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 Eco-Waters, and the Water Resources Center at the University of Minnesota to design a sustainable water management process. The distribution of geologic materials defines aquifer boundaries and the connection of aquifers to the land surface and to surface water resources to enable a comprehensive water management effort. This proposal will complete current projects and start new projects to equal about 10 complete atlases.

This project continues an effort to accelerate county geologic atlas coverage 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 38 counties have a completed Part A atlas, 10 new atlases and 2 revisions are underway. Of the 39 counties without an atlas, 7 have committed to participation. The current spending rate of about \$2 million per year (all sources) would allow about 5 or 6 new starts each year. The MGS proposal currently pending will likely initiate projects in all or most of the counties classified as pending on the status map. Funds from this proposal are most likely to be applied to projects in southwest, west-central, and northwestern Minnesota and probably revision of one or more existing atlases.

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 Eco-Waters Division (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. A queue of counties that have committed to the program has formed, and these counties are working on their in-kind tasks.

Atlases enhance natural resource management and regulation, and facilitate wise use of water resources. They support: 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 current water levels and quality so that changes in the water system can be recognized and evaluated. A User's Guide to geologic atlases strives to make the products accessible to users of all backgrounds.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: Initiate about 6 new county geologic atlases; continue existing projects- equivalent of about 10 atlases total **Budget: \$4,121,625**

Atlases begin with compilation of a database of subsurface information including well records. The local project partner establishes accurate digital locations for these wells. 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 shallow and deep drilling programs and geophysical, geochemical, and geochronologic surveys. Analysis of the 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. The number of



Environment and Natural Resources Trust Fund (ENRTF)

2018 Main Proposal

Project Title: *Minnesota Geological Survey Geologic Atlases For Water Resource Management*

counties we can map with these funds will be affected by the size, geologic complexity, and data availability of the counties that are chosen.

Outcome	Completion Date
1. Create database of well construction records to support the mapping, to document water use in specific aquifers, and to help resolve well problems	June 30, 2021
2. Complete any unfinished ENRTF supported County Geologic Atlas projects in progress (ex; from 2015 appropriation).	June 30, 2021
3. Make progress on maps of bedrock geology, surficial geology, subsurface Quaternary geology, bedrock topography, and thickness of glacial deposits.	June 30, 2021

III. PROJECT STRATEGY

A. Project Team/Partners

- MGS team of as many as 20 staff members including database specialists, geologists, geophysicists, geographic information system specialists, and an editor.
- DNR team will follow and construct Part B of the atlas which addresses water levels, water chemistry, and sensitivity using separate funding.
- The local partner (county office) will establish accurate well locations, and identify specific project needs.
- We will apply to federal geologic mapping cost-share programs to leverage additional funds.

B. Project Impact and Long-Term Strategy

MGS is the geologic mapping agency of the state and is striving to provide comprehensive geologic mapping and associated databases at appropriate scales statewide as quickly as possible, primarily via the County Geologic Atlas Program. Atlases are complete or underway for 48 of the 87 counties in Minnesota. The completed atlases are used by townships, counties, state agencies, researchers, consultants, industries, and even homeowners. They support the activities and programs responsible for managing Minnesota resources in a sustainable manner. The attached chart of recent and future funding of the program illustrates how ENRTF appropriations have increased activity to a level of approximately \$2,000,000 per year. At this level of spending statewide coverage and updating of several existing atlases could be achieved in approximately 8 years.

C. Timeline Requirements

Work will be initiated in 2018 and continue for four years. Most atlases require 3 to 4 years to complete, so some projects started in this proposal may not be finished and require additional funding. The funding level of this proposal is sized to continue the overall funding of atlases at the MGS to complete 5 counties per year, and covering the entire state by about 2026.

2018 Detailed Project Budget

Project Title: Minnesota Geological Survey Geologic Atlases for Water Resource Management

IV. TOTAL ENRTF REQUEST BUDGET 4 years

<u>BUDGET ITEM</u>	<u>AMOUNT</u>
Personnel: The total effort averages about 4 FTE per atlas or about 36 FTE for this proposal. The cost includes the University fringe benefits (27.2% to 33.5%; different rates for different employee classifications). No overhead is charged. 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.	\$ 2,950,000
Professional/Technical/Service Contracts: rotasonic test hole drilling (awarded by a competitive bidding process). Generally 3-6 holes per county (estimated at \$80,000 per county), based on 10 counties. Rotasonic method yields 4" undisturbed core of unconsolidated deposits. Average hole cost is \$16,500 but varies with depth. Depth corresponds to depth of bedrock surface. Drilling costs are shared with support from our DNR contract (about \$200,000).	\$ 600,000
Professional/Technical/Service Contracts: offset printing; awarded by price comparison; typically 500 copies of each of 6 plates (each 3' by 3' and four color) per county, current prices about \$14,000 per county. Print run has been lowered as there are more online users.	\$ 140,000
Professional/Technical/Service Contracts: geochemical and geochronological analyses to support aquifer correlation and delineation; laboratories will be evaluated based on cost and capabilities in accordance with U of M purchasing rules. Contracts or bids as necessary. We anticipate about 1,875 geochemical analyses (\$84,375) and 20 geochronological analyses @\$1,000 each (\$20,000).	\$ 104,375
Equipment/Tools/Supplies: Field and lab expendables (batteries, sample bags, replacement augers as needed (\$305 each), Giddings Probe repair parts, maps, core boxes (\$7.75 each, about 950 boxes per county, \$7,362 per county, \$73,625 total, core to Hibbing repository), distilled water)	\$ 106,250
Travel: vehicle rental from U Fleet Services as needed, typically on weekly basis, and mileage (approx. \$245 sedan rental, \$0.17 per miles, \$275 per week truck, \$0.37 per mile); meals (up to \$46 per day); lodging as per University regulations. Amounts cannot be calculated until project locations (counties, distances) are known.	\$ 221,000
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =	\$ 4,121,625

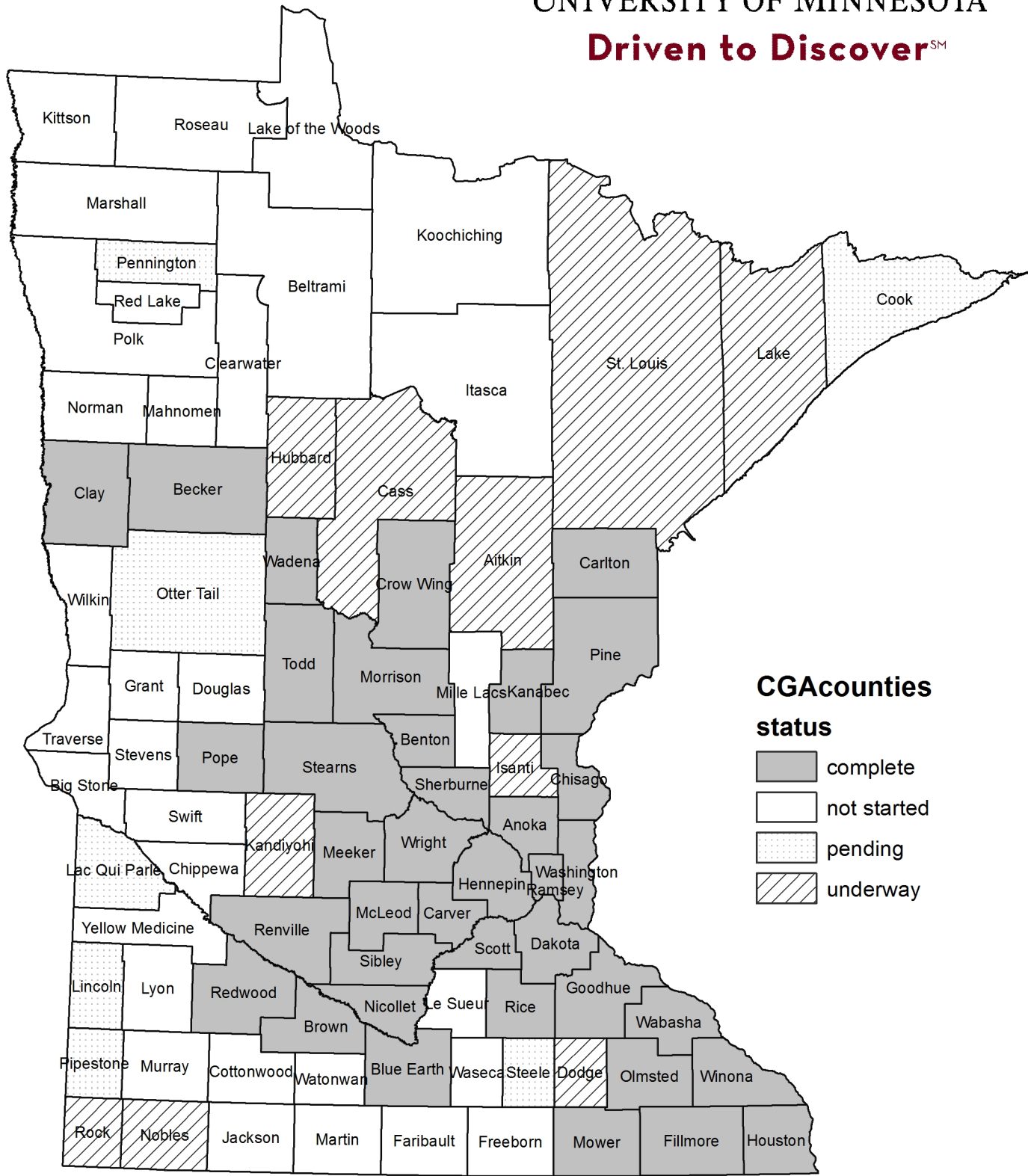
V. OTHER FUNDS

<u>SOURCE OF FUNDS</u>	<u>AMOUNT</u>	<u>Status</u>
Other Non-State \$ To Be Applied To Project During Project Period: MGS competes for federal cost-sharing of geologic mapping through the STATEMAP Program, the Great Lakes Geologic Mapping Coalition, and the USGS Data Preservation Program. Each requires a 1:1 match of federal dollars with non-federal dollars. MGS has used these programs to fund map elements of geologic atlases, or improvement of databases utilized in geologic atlas work. The figure provided represents pending proposals.	\$ 169,000	pending
Other State \$ To Be Applied To Project During Project Period: DNR Eco-Waters for \$500,000 for 2017-2019.	\$ 550,000	pending
In-kind Services To Be Applied To Project During Project Period: each county participant is asked to establish accurate locations for wells with construction records; value varies with number of records and size of county; probably \$10,000 to \$50,000	\$ -	secured
Past and Current ENRTF Appropriation: ML 2007, Ch.30, Sec 2 subd 05j \$400,000; ML 2009, Ch.143, Sec 2, subd03b \$820,000; ML 2010, Ch.362, Sec 2, subd 03a \$1,130,000; ML 2011, 1st Spec Sess. Ch.2, subd 03b \$1,200,000; ML 2013, Ch.52, Sec 2, subd 03b \$1,200,000; ML 2015 Ch. 76, Sec 2, subd 03a \$2,040,000	\$ -	spent
Other Funding History: ENRTF award of \$4,729,000 for 2017-2020. Pending Legislative process	\$ 4,729,000	pending

Status of Part A Geologic Atlases April 2017



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

**Minnesota Geological Survey:
Geologic Atlases for Water Resource Management**

Project Manager: Dale R. Setterholm

Qualifications:

Education

MS in Management of Technology, Carlson School of Management
University of Minnesota, Minneapolis, MN, 1999

Capstone Project: *A Project Management System for the
Minnesota Geological Survey*

BS in Geology, Institute of Technology, University of Minnesota, Minneapolis,
MN 1979

Professional Experience

Geologist, Minnesota Geological Survey, 1979-2016
Assistant to the Director, Minnesota Geological Survey 1997-2006
Associate Director, Minnesota Geological Survey 2007-2017

Participate in strategic planning, budget development, program administration, project management, personnel administration, purchasing, facilities management, information systems planning, search and hiring procedures, contract development, grants administration, and client relations.

Geologic interests and experience include:

- building subsurface geologic databases and applying them to geologic mapping and water resource management.
- the relationship of geologic settings and ground water sensitivity.
- the influence of geologic settings on water levels and water quality in lake management.

Organization Description:

The Minnesota Geological Survey is the geologic mapping agency for the State of Minnesota, as directed by its enabling legislation. Its goal is to produce comprehensive geologic mapping and related databases statewide at a scale of 1:100,000 or more detailed. This mapping supports informed land use management and decision-making that protects and wisely allocates resources. The MGS is part of the N.H. Winchell School of Earth Sciences in the College of Science and Engineering at the University of Minnesota. It has existed since 1872 and has a current staff of approximately 32.

