



# Environment and Natural Resources Trust Fund

## 2021 Request for Proposal

### General Information

**Proposal ID:** 2021-138

**Proposal Title:** Geologic Atlases for Water Resource Management

### Project Manager Information

**Name:** Barbara Lusardi

**Organization:** U of MN - MN Geological Survey

**Office Telephone:** (612) 626-5119

**Email:** luser001@umn.edu

### Project Basic Information

**Project Summary:** Geologic atlases provide maps/databases essential for improved management of ground and surface water. This proposal will complete current projects and start new projects to equal about 10 complete atlases.

**Funds Requested:** \$4,122,000

**Proposed Project Completion:** 2024-06-30

**LCCMR Funding Category:** Foundational Natural Resource Data and Information (A)

### Project Location

**What is the best scale for describing where your work will take place?**

Statewide

**What is the best scale to describe the area impacted by your work?**

Statewide

**When will the work impact occur?**

In the Future

## Narrative

### **Describe the opportunity or problem your proposal seeks to address. Include any relevant background information.**

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.

Atlases are complete or underway for 66 of the 87 counties in Minnesota with recent starts in Faribault, Waseca, Grant, Douglas, and Lake of the Woods counties. This project continues an effort to complete county geologic atlas coverage statewide. The current spending rate of about \$2 million per year (all sources) would allow about 5 new starts each year—a plan in which we start the 87th county in 2025 and completing the entire state in this format in 2029.

### **What is your proposed solution to the problem or opportunity discussed above? i.e. What are you seeking funding to do? You will be asked to expand on this in Activities and Milestones.**

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 groundwater. 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).

Atlases begin with compilation of a database of subsurface information including well records. The county 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.

### **What are the specific project outcomes as they relate to the public purpose of protection, conservation, preservation, and enhancement of the state's natural resources?**

This proposal will complete current projects and start new projects to equal about 10 complete atlases. Specific outcomes are as follows:

1. Create database of well construction records to support the mapping, to document water use in specific aquifers, and to help resolve well problems
2. Complete any unfinished ENRTF supported County Geologic Atlas projects in progress (ex; from 2019/2020 appropriations)
3. Make progress on maps of bedrock geology, surficial geology, subsurface Quaternary geology, bedrock topography, and thickness of glacial deposits

Atlases support: permitting, land use planning, wellhead protection, remediation, nutrient management, monitoring, modeling, and well construction.



## Activities and Milestones

**Activity 1: Initiate about 6 new county geologic atlases; continue existing projects—equivalent of about 10 atlases total**

**Activity Budget:** \$4,122,000

**Activity Description:**

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

**Activity Milestones:**

Description	Completion Date
Make progress on bedrock geology, surficial geology, subsurface geology, bedrock topography, and drift thickness maps	2024-06-30
Complete any unfinished ENRTF supported County Geologic Atlas projects in progress	2024-06-30
Create database of well construction records to support the mapping	2024-06-30

## Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
MN Counties	MN Counties	The counties are required to provide funds or in-kind service to help us build our database. Counties establish accurate well locations and identify specific project needs.	No
Paul Putzier	MN Dept. of Natural Resources- Ecological and Water Resources	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 groundwater--water levels, water chemistry, and sensitivity.	Yes

## Long-Term Implementation and Funding

**Describe how the results will be implemented and how any ongoing effort will be funded. If not already addressed as part of the project, how will findings, results, and products developed be implemented after project completion? If additional work is needed, how will this be funded?**

Atlases are complete or underway for 66 of the 87 counties. Work will be initiated in 2021 and continue for three years. Most atlases require 3 to 4 years to complete, so some projects started in this proposal may not be finished and will require additional funding. The funding level of this proposal is sized to continue the overall funding of geologic atlases (Part A) that are currently underway while initiating about 6 new atlases for an equivalent of about 10 atlases total. At this pace, we estimate that we will complete statewide coverage by about 2029.

## Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
County Geologic Atlases - Part A, Mapping Geology	M.L. 2019, First Special Session, Chp. 4, Art. 2, Sec. 2, Subd. 03n	\$2,000,000
County Geologic Atlases - Part A	M.L. 2018, Chp. 214, Art. 4, Sec. 2, Subd. 03a	-
County Geologic Atlases - Continuation	M.L. 2017, Chp. 96, Sec. 2, Subd. 03a	\$2,000,000
County Geologic Atlases - Part A	M.L. 2015, Chp. 76, Sec. 2, Subd. 03a	\$2,040,000

## Project Manager and Organization Qualifications

**Project Manager Name:** Barbara Lusardi

**Job Title:** Associate Director

**Provide description of the project manager's qualifications to manage the proposed project.**

Barbara Lusardi has been with the Minnesota Geological Survey for nearly 28 years. Thus, she has decades of experience implementing all aspects of the County Geologic Atlas program from scientist to supervisor. A brief outline of Barbara's education and experience is listed below.

### Education

UNIVERSITY OF MAINE, Orono, Maine

Master of Science—Geology (1992)

“Late glacial to postglacial paleo-environmental reconstruction in the eastern Gulf of Maine.”

WAYNESBURG COLLEGE, Waynesburg, Pennsylvania

Bachelor of Science—Geology (1989)

Professional Experience

MINNESOTA GEOLOGICAL SURVEY, University of Minnesota, St. Paul, MN

Associate Director (2018-present)

Geologist (1992-present)

Outreach Coordinator (1994-present)

Associate Director

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.

Geologist

Map glacial sediments at the surface and in the subsurface; Conduct fieldwork and laboratory analyses; compile, analyze and interpret data; create surficial geologic maps, stratigraphic cross sections, and digital databases that provide geologic framework necessary to manage land and water resources.

Outreach Coordinator

Communicate to external audiences (government agencies, county officials, news media, and general public) to provide geologic information and to promote MGS initiatives and programs.

**Organization:** U of MN - MN Geological Survey

**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.

## Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
<b>Personnel</b>								
16 Geologists		Create geologic maps; collect and interpret data, draw map, write text, draft figures , present results			32%	25.2		\$2,065,000
1 editor		Edit maps, text, and figures for publication; coordinates printing			32%	1.44		\$118,000
3 Database specialists		Database development and support: database development for existing and new projects; train and supervise internal and external staff in well location; data collection of downhole geophysical data			32%	3.6		\$295,000
2 field assistants		Assist geologists with collection and processing of geologic information in the laboratory, field and office			32%	1.44		\$118,000
3 GIS/computer/web development specialists		Create GIS products leading to final print and digital versions of maps, cross sections and sand distribution models; finalize and archive GIS data; develop web accessible content			32%	4.32		\$354,000
							<b>Sub Total</b>	<b>\$2,950,000</b>
<b>Contracts and Services</b>								
TBD	Professional or Technical Service Contract	Rotary sonic test hole drilling (competitive bid). Generally 3-6 holes per county. Rotary sonic 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 DNR contract.				-		\$600,000
TBD	Professional or Technical Service Contract	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 Includes \$500 for sample shipping.				-		\$104,375
TBD	Professional or Technical	Laboratory analyses not relating to geochemistry project outlined above; includes but not limited to				-		\$15,000

	Service Contract	thin sections, pollen counts, radiocarbon dates; laboratories will be evaluated based on cost and capabilities in accordance with U of M purchasing rules. Contracts or bids as necessary.						
							<b>Sub Total</b>	<b>\$719,375</b>
	<b>Equipment, Tools, and Supplies</b>							
	Tools and Supplies	Field and lab expendables (batteries, sample bags, distilled water); Giddings probe repairs and parts; maps, core boxes	These items are needed to collect, process, and store samples					\$98,625
							<b>Sub Total</b>	<b>\$98,625</b>
	<b>Capital Expenditures</b>							
							<b>Sub Total</b>	-
	<b>Acquisitions and Stewardship</b>							
							<b>Sub Total</b>	-
	<b>Travel In Minnesota</b>							
	Miles/ Meals/ Lodging	Vehicle rental as needed (weekly and mileage); meals; lodging; amounts cannot be calculated until specific project locations are known	Geologists must travel to each county in order to collect samples, identify rocks and sediment, interpret landforms, drill and log core, and to train county staff. In order to be most efficient, geologists may spend several days to weeks in the field.					\$214,000
							<b>Sub Total</b>	<b>\$214,000</b>
	<b>Travel Outside Minnesota</b>							
							<b>Sub Total</b>	-
	<b>Printing and Publication</b>							
	Printing	Offset printing; awarded by price comparison; typically 500 copies of each of 6 plates (each 3' by	Map plates are best viewed on a printed page. Digital files are also					\$140,000



		3' and four color) per county, current prices about \$14,000 per county. Print run has been lowered as there are more online users.	made available (PDF, GIS, web browser)					
							<b>Sub Total</b>	<b>\$140,000</b>
<b>Other Expenses</b>								
							<b>Sub Total</b>	<b>-</b>
							<b>Grand Total</b>	<b>\$4,122,000</b>

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
---------------	---------------------	-------------	--

## Non ENRTF Funds

Category	Specific Source	Use	Status	Amount
<b>State</b>				
Cash	MN Department of Natural Resources Amendment #1 to Contract 127919/3000116814/Ad hoc: 1549 SWIFT contract #: 127919/3000116814	The MGS will work on the following program elements and associated activities during the biennium: 1) Completion and printing of the Part A portion of current atlas projects. 2) Continuation of current and new CGAs. 3) Initiation of preliminary work on new county geologic atlases, if funds are available. 4) Scientific drilling to augment county geologic atlas projects. Funds are distributed as follows: Items 1-3: \$150,000 FY20 and \$150,000 FY21: Total \$300,000 Item 4: \$100,000 FY20 and \$100,000 FY21: Total \$200,000	Secured	\$500,000
Cash	Clean Water Funds (FY20 distribution): \$250,000 Clean Water Funds (FY21 distribution): \$250,000	Used to supplement other funding sources to complete County Geologic Atlases (Part A) for the entire state; funding to continue ongoing atlases and to start new atlas projects (including but not limited to database development, mapping, drilling, sample analyses, editing and production (print and digital files)	Secured	\$500,000
Cash	Clean Water Funds FY22 proposed (This funding source is likely to be restricted due to lower than anticipated tax revenue)	Continuation of CGA program	Potential	\$1,000,000
			<b>State Sub Total</b>	<b>\$2,000,000</b>
<b>Non-State</b>				
Cash	USGS Statemap program (estimate pending) \$100,000 USGS Great Lakes Geologic Mapping Coalition (estimate pending) \$55,000 Funds listed are for CGA related work and are estimated based on current request and prior awards.	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 is an estimate based on pending proposals.	Pending	\$155,000
In-Kind	Individual counties; value varies with the number of records and the size of the county; estimated to be \$10,000 to \$50,000	Individual counties are required to establish accurate locations for water wells with construction records. This helps MGS build a database of geologic information that is vital to our mapping process.	Secured	\$25,000
			<b>Non State Sub Total</b>	<b>\$180,000</b>
			<b>Funds Total</b>	<b>\$2,180,000</b>

## Attachments

### Required Attachments

#### *Visual Component*

File: [b2ce9fdc-a9b.pdf](#)

#### *Alternate Text for Visual Component*

Status map showing the counties for which CGA is complete (43) or underway (23) and which counties have not yet been started (21).

Funding graph showing 11-year spending history from 2010-2020. Current-year spending is estimated through June. Spending amounts are indicated by sponsor (ENRTF, CWF, DNR, and Fed). In addition, the graph shows the funding required to complete CGA's for the rest of Minnesota counties in the next 9 years including estimated carry forward, pending, and proposed funding. Future funding is not indicated by sponsor, nor is it necessarily shown in the time period during which it will be spent.

## Administrative Use

**Does your project include restoration or acquisition of land rights?**

No

**Does your project have patent, royalties, or revenue potential?**

No

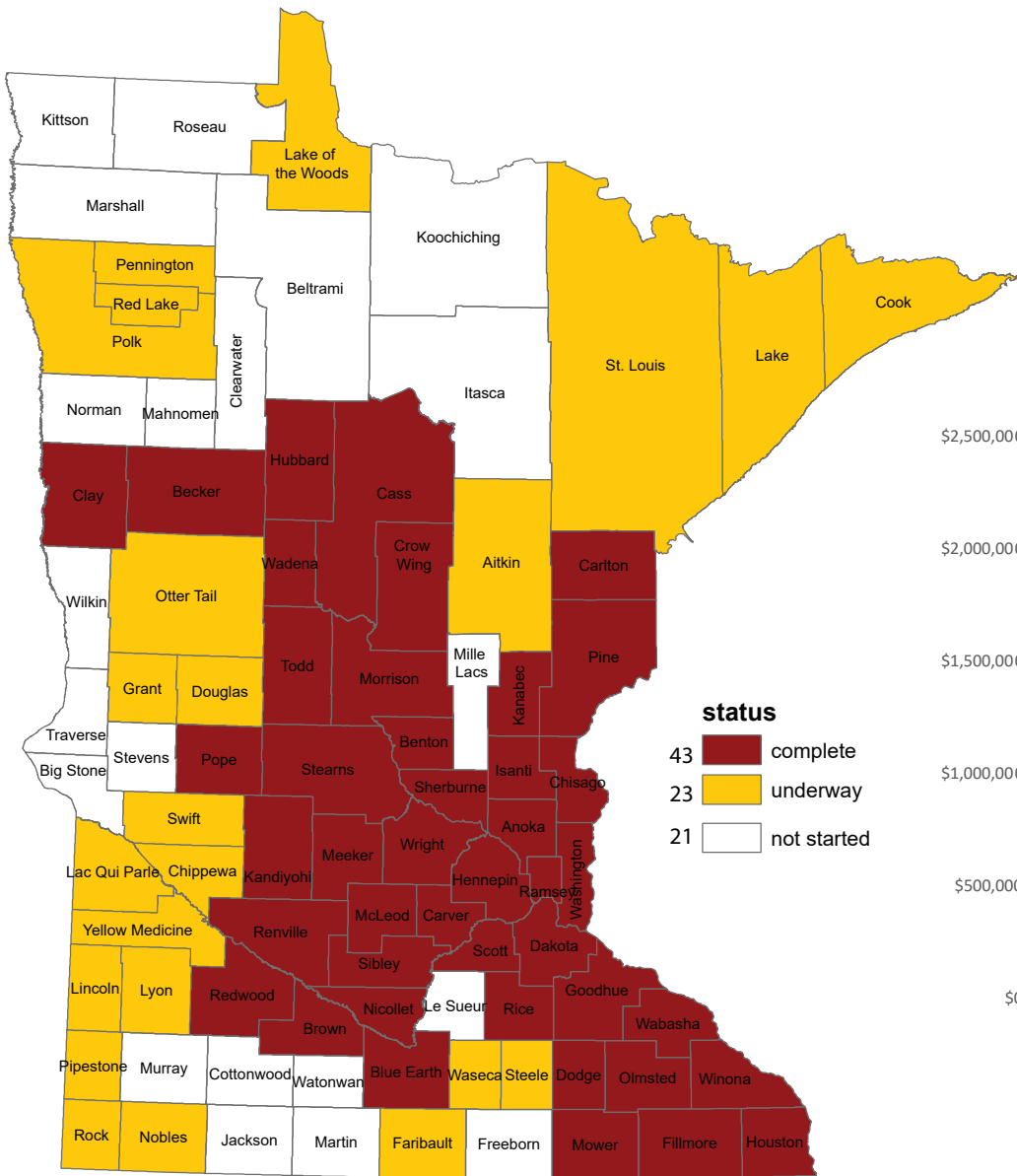
**Does your project include research?**

Yes

**Does the organization have a fiscal agent for this project?**

Yes, Sponsored Projects Administration

# Status of County Geologic Atlas Part A

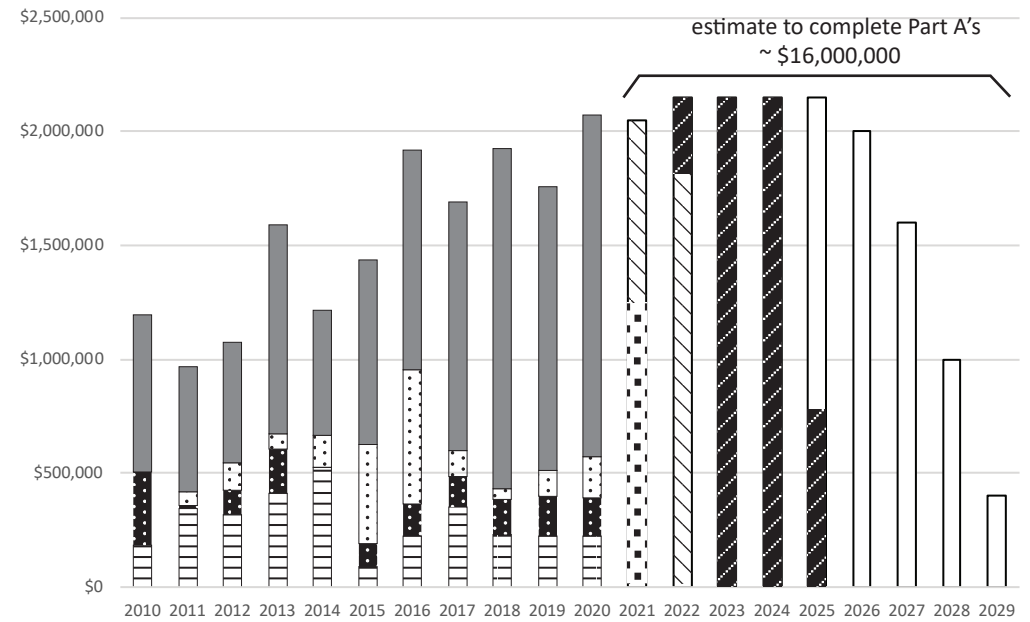


03/31/2020



## UNIVERSITY OF MINNESOTA Driven to Discover<sup>SM</sup>

### County Geologic Atlas Part A Funding History and Projection



Spending History (2010-2020\*)

- ENRTF
- Clean Water Funds
- Federal Cost Share
- Dept. Natural Resources

\*FY20 spending estimated

Funding projection (2021-2029^)

- Carry Forward
- Pending awards FY22
- Proposed FY23
- Additional funds

^Future funding is not shown in the time-frame during which it will likely be spent

