



# Environment and Natural Resources Trust Fund

## 2022 Request for Proposal

### General Information

**Proposal ID:** 2022-106

**Proposal Title:** County Groundwater Atlas ML2022

### Project Manager Information

**Name:** Paul Putzier

**Organization:** MN DNR - Ecological and Water Resources Division

**Office Telephone:** (651) 259-5692

**Email:** paul.putzier@state.mn.us

### Project Basic Information

**Project Summary:** This project supports continuing development of the County Groundwater Atlases. The goal is to provide this valuable water and resource management “information infrastructure” to every county in Minnesota.

**Funds Requested:** \$1,400,000

**Proposed Project Completion:** June 30 2025

**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?**

During the Project and In the Future

## Narrative

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

Groundwater is one of the most valuable, often overlooked, and misunderstood natural resources. Our state is placing more demands on our groundwater. The challenges to balance wise-use and protection will only increase over time. The Groundwater Atlas is one important tool for professional planners, resource managers and researchers to help make these critical informed judgments.

### **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.**

To address this pressing need, our goal is a Groundwater Atlas for all Minnesota counties as soon as possible. This funding will support atlas work on four or more counties. The atlas is a critical tool for a broad range of resource managers. It provides comprehensive geologic and groundwater mapping and associated information for planners, managers, scientists and citizens statewide for a wide variety of projects such as: water supply planning, land use decisions, resource development, resource protection, transportation planning, agricultural water supply, groundwater research/studies, and Environmental Impact Statements.

An example from Stacey Stark, University of Minnesota-Duluth, "We use the groundwater atlas to make maps to support content in county Hazard Mitigation Plans, as required by FEMA to receive federal mitigation program dollars/funds. We facilitate the update of these plans for almost half of all Minnesota counties. Without the groundwater atlas, we would not have easy access to information about groundwater sensitivity and would likely leave this out of the plan. One of our goals is to outline potential hazards and assemble resources for them to address mitigation actions. Perhaps the most valuable is to get information in the hands of others for future planning and education."

### **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?**

The atlases will provide foundational natural resource data and information for maintaining long-term stable water supplies for growing economies, and help protect ecological systems that rely on groundwater. They also provide information and training for future resource managers who will be grappling with the many challenges of balancing wise-use and preservation of their groundwater resources. For example, Martin Larsen, Olmsted County Feedlot Technician, landowner and farmer, said "The Atlas is an important tool for the Olmsted Soil and Water Conservation District, used for animal feedlot permitting and nutrient management planning, locating sinkholes, depth to bedrock and first encountered bedrock."

## Activities and Milestones

### Activity 1: Publication of Groundwater Atlases

**Activity Budget:** \$1,400,000

**Activity Description:**

The DNR will analyze data from the Geological Survey Part A atlases, prepare a sampling plan, collect up to 110 groundwater samples in each of four counties. For ongoing atlas work in other counties, compile field chemistry; analyze groundwater samples for natural chemistry and age-dating isotopes; and assemble aquifer characteristics for ongoing atlases. The project includes preparing groundwater flow direction maps and groundwater cross sections, pollution sensitivity maps and a published report for each county.

This project will provide GIS data layers for use in decision-support systems, such as county land use planning, and county environmental programs. The assembled GIS layers and electronic files also make the information usable for local, regional, and state decision makers, scientists, industry and citizens.

To introduce local resource professionals to the atlas when complete, the DNR provides hands-on workshops and field trips in cooperation with county staff. Workshops include real-life exercises that demonstrate some of the critical and creative ways to use the groundwater atlas to manage resources.

Project design and data collection for counties in southeast Minnesota may include specialty mapping of the karst groundwater conditions, including dye tracing to help understand complex groundwater flow conditions in this area of vulnerable natural resources.

**Activity Milestones:**

Description	Completion Date
Complete groundwater sampling for four new counties (Aitkin, Lake, St. Louis, Otter Tail)	June 30 2024
Complete up to four county stakeholder workshops	June 30 2025
Publication of four completed County Groundwater Atlases	June 30 2025

## 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?**

The DNR provides training and support to atlas users, through workshops, field trips, user guides, conference and media presentations and importantly, ongoing support to individual resource managers on specific projects and challenges. Additionally, DNR uses data from each newly completed atlas to update state-wide atlas products like the Groundwater Provinces Maps, Pollution Sensitivity of the Bedrock Surface & Near Surface Materials, spring shed mapping and the extensive chemistry database. With ongoing funding from DNR, atlas groundwater professional staff will continue to provide atlas-related support as needed after each county atlas is completed.

## Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
County Geologic Atlases - Part B, Mapping Aquifer Hydrology	M.L. 2019, First Special Session, Chp. 4, Art. 2, Sec. 2, Subd. 03o	\$2,400,000

## Project Manager and Organization Qualifications

**Project Manager Name:** Paul Putzier

**Job Title:** Hydrogeologist Supervisor, County Groundwater Atlas Program

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

Paul is the supervisor for the Minnesota Department of Natural Resources County Groundwater Atlas Program. He leads the team responsible for completing detailed mapping of groundwater and other resources in each of Minnesota's 87 counties. Prior to assuming the supervisor position in 2016, Paul was a Lead Hydrogeologist at the DNR developing the agency's Groundwater Management Area program and as the Project Manager for the North & East Metro Groundwater Management Area, evaluating groundwater sustainability issues. Before joining the DNR in 2011, Paul held positions as Operations Manager, Project Manager and Senior Hydrogeologist over the last 25 years for several national consulting firms. He earned a Bachelor of Science in Geology/Geophysics from the University of Wisconsin, Madison and a Master of Science in Geology (with a specialty in hydrogeology) from the University of South Florida, Tampa.

**Organization:** MN DNR - Ecological and Water Resources Division

**Organization Description:**

The mission of the Minnesota DNR is to work with citizens to conserve and manage the state's natural resources, to provide outdoor recreation opportunities, and to provide for the commercial uses of natural resources in a way that creates a sustainable quality of life. The Department consists of seven Divisions including Fish and Wildlife, Forestry, Lands and Minerals, Parks and Trails, Enforcement, Operations Services and Ecological and Water Resources, as well as four regions. The DNR has extensive experience administering and coordinating projects funded by the ENRTF.

## Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
<b>Personnel</b>								
Hydrogeologist Supervisor		Project Manager/Senior Technical			20%	0.5	X	\$69,200
Research Scientist/Hydrogeologist		Chief Author/Senior Technical			20%	1	X	\$138,300
Senior Groundwater Specialist		Project Lead/Karst Geology Specialist			20%	0.5	X	\$65,000
Hydrogeologist 3		Hydrogeologist/Lead Author			20%	1	X	\$115,700
Hydrogeologist 2		Hydrogeologist/Author			20%	1	X	\$115,300
Hydrogeologist 2		Hydrogeologist/Author			20%	1	X	\$94,300
Hydrogeologist 1		Hydrogeologist/Fieldwork Lead			20%	1	X	\$83,800
Hydrogeologist 1		Hydrogeologist/Fieldwork Lead			20%	1	X	\$83,668
Information Officer 2		Technical Editor & Publisher			20%	0.5	X	\$43,000
Research Analyst Senior		Lead GIS			20%	0.5	X	\$45,000
Hydrogeologist 2		Hydrogeologist/Field Lead			20%	1	X	\$90,000
							<b>Sub Total</b>	<b>\$943,268</b>
<b>Contracts and Services</b>								
Minnesota Department of Agriculture Chemistry Laboratory	Professional or Technical Service Contract	The MDA Chemistry Laboratory provides comprehensive chemical analysis of approximately 110 groundwater samples from each county included in the atlas schedule. With ML2022 funding, groundwater from up to four counties would be analyzed by for a total of approximately 440 samples analyzed, at a total cost of approximately \$170,400		X		0.1		\$170,400
University of Minnesota Chemistry Laboratory	Professional or Technical Service Contract	The UofM Chemistry Laboratory provides carbon-14 analysis of groundwater samples collected for each county to understand groundwater residence time and groundwater-surface water connections. Analytical costs are approximately \$7,600 per county, or \$30,400 for four counties.		X		0.5		\$30,400
University of Waterloo Chemistry Laboratory	Professional or Technical	The University of Waterloo Chemistry Laboratory provides unique laboratory analytical		X		0.5		\$78,000

	Service Contract	service that are not readily available from other vendors for tritium and stable isotopes in groundwater. Cost per county for tritium and stable isotope analysis is approximately \$19,500, or a total cost for four counties of approximately \$78,000.						
							<b>Sub Total</b>	<b>\$278,800</b>
<b>Equipment, Tools, and Supplies</b>								
	Tools and Supplies	Supplies, including expendable water sampling supplies. Approx. 440 samples total @ \$30/sample: new high volume micro filters, valves and tubing for each well sampled, titration supplies (est. \$16,600). Shipping costs for water samples to laboratories (est. \$1,000).	Disposable supplies used for approximately 110 samples in each of the four counties sampled as part of this proposal.					\$17,600
	Equipment	Non-capital equipment including: expendable water sampling and measurement tools and field analytical meters and equipment (individual instruments/equipment cost less than \$5000 each). Estimated total is \$17,828 for replacement of multiple individual meters: Trimble, iPads, Hack water quality meters, Rugged Pro field probes and titrate system.	Required equipment and instruments for groundwater sampling.					\$17,828
							<b>Sub Total</b>	<b>\$35,428</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	In-state vehicle mileage (est. \$25,400) and travel expenses for meals and lodging (est. \$24,155), primarily for groundwater sampling and field data collection in up to four counties (primarily in Greater MN). All travel per the DNR travel policy. Assumes return to 'normal' travel	Groundwater sampling in up to four counties.					\$49,555

		conditions (non-covid), with multiple staff per vehicle.						
							<b>Sub Total</b>	<b>\$49,555</b>
<b>Travel Outside Minnesota</b>								
							<b>Sub Total</b>	<b>-</b>
<b>Printing and Publication</b>								
	Printing	Each Groundwater Atlas includes hard-copy publication and digital posting. This includes off-set printing of approximately 150 copies: 1) One 40-60 page bound report with up to 40 color figures, maps and tables, 2) Three to four full color map plates that are each approximately 24-inches by 36-inches in size. Some Atlases require a second, figures only, bound report. Printing costs also include vendor preparation of 1,000 post cards for each county and postage to mail to citizens to obtain permission for water-well sampling. Total anticipated printing costs per county (cards, atlases, postage) estimated to be \$7,000. Printing and associated costs for four (4) county atlases estimated to be ~\$28,000. 0.	Post cards are used to request permission from well owners to collect samples from their wells. Approximately 200 copies of the Groundwater Atlas are printed in hard copy for each county for distribution to stakeholders and resource managers. Postage costs are included for post cards and sending copies of the atlas to stakeholders.					\$28,000
							<b>Sub Total</b>	<b>\$28,000</b>
<b>Other Expenses</b>								
		*Direct and Necessary Expenses: HR Support (~\$14,978), Safety Support (~\$2,319), Financial Support (~\$13,466), Communication Support (~\$1,311), IT Support (~\$31,867), and Planning Support (~\$1,008) necessary to accomplish funded programs/projects.	*Estimated Direct and Necessary Expenses includes all Department Support Services.					\$64,949
							<b>Sub Total</b>	<b>\$64,949</b>
							<b>Grand Total</b>	<b>\$1,400,000</b>

## Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
Personnel - Hydrogeologist Supervisor		Project Manager/Senior Technical	<b>Classified</b> : Because the atlas program represents a longer-term project (decades) to complete an atlas for all 87 counties in Minnesota, most staff paid for with ENRTF funds are in classified positions hired specifically to accelerate the completion of the atlas work. Staff in these positions generally did not have and currently do not have other assignments. The positions will be vacated and the approved complement of the agency reduced accordingly once the long-term project is complete.
Personnel - Research Scientist/Hydrogeologist		Chief Author/Senior Technical	<b>Classified</b> : Because the atlas program represents a longer-term project (decades) to complete an atlas for all 87 counties in Minnesota, most staff paid for with ENRTF funds are in classified positions hired specifically to accelerate the completion of the atlas work. Staff in these positions generally did not have and currently do not have other assignments. The positions will be vacated and the approved complement of the agency reduced accordingly once the long-term project is complete.
Personnel - Senior Groundwater Specialist		Project Lead/Karst Geology Specialist	<b>Classified</b> : Because the atlas program represents a longer-term project (decades) to complete an atlas for all 87 counties in Minnesota, most staff paid for with ENRTF funds are in classified positions hired specifically to accelerate the completion of the atlas work. Staff in these positions generally did not have and currently do not have other assignments. The positions will be vacated and the approved complement of the agency reduced accordingly once the long-term project is complete.
Personnel - Hydrogeologist 3		Hydrogeologist/Lead Author	<b>Classified</b> : Because the atlas program represents a longer-term project (decades) to complete an atlas for all 87 counties in Minnesota, most staff paid for with ENRTF funds are in classified positions hired specifically to accelerate the completion of the atlas work. Staff in these positions generally did not have and currently do not have other assignments. The positions will be vacated and the approved complement of the agency reduced accordingly once the long-term project is complete.
Personnel - Hydrogeologist 2		Hydrogeologist/Author	<b>Classified</b> : Because the atlas program represents a longer-term project (decades) to complete an atlas for all 87 counties in Minnesota, most staff paid for with ENRTF funds are in classified positions hired specifically to accelerate the completion of the atlas work. Staff in these positions generally did not have and currently do not have other assignments. The positions will be vacated and the approved complement of the agency reduced accordingly once the long-term project is complete.
Personnel - Hydrogeologist 2		Hydrogeologist/Author	<b>Classified</b> : Because the atlas program represents a longer-term project (decades) to complete an atlas for all 87 counties in Minnesota, most staff paid for with ENRTF



			funds are in classified positions hired specifically to accelerate the completion of the atlas work. Staff in these positions generally did not have and currently do not have other assignments. The positions will be vacated and the approved complement of the agency reduced accordingly once the long-term project is complete.
<b>Personnel - Hydrogeologist 1</b>		Hydrogeologist/Fieldwork Lead	<b>Classified :</b> Because the atlas program represents a longer-term project (decades) to complete an atlas for all 87 counties in Minnesota, most staff paid for with ENRTF funds are in classified positions hired specifically to accelerate the completion of the atlas work. Staff in these positions generally did not have and currently do not have other assignments. The positions will be vacated and the approved complement of the agency reduced accordingly once the long-term project is complete.
<b>Personnel - Hydrogeologist 1</b>		Hydrogeologist/Fieldwork Lead	<b>Classified :</b> Because the atlas program represents a longer-term project (decades) to complete an atlas for all 87 counties in Minnesota, most staff paid for with ENRTF funds are in classified positions hired specifically to accelerate the completion of the atlas work. Staff in these positions generally did not have and currently do not have other assignments. The positions will be vacated and the approved complement of the agency reduced accordingly once the long-term project is complete.
<b>Personnel - Information Officer 2</b>		Technical Editor & Publisher	<b>Classified :</b> Because the atlas program represents a longer-term project (decades) to complete an atlas for all 87 counties in Minnesota, most staff paid for with ENRTF funds are in classified positions hired specifically to accelerate the completion of the atlas work. Staff in these positions generally did not have and currently do not have other assignments. The positions will be vacated and the approved complement of the agency reduced accordingly once the long-term project is complete.
<b>Personnel - Research Analyst Senior</b>		Lead GIS	<b>Classified :</b> Because the atlas program represents a longer-term project (decades) to complete an atlas for all 87 counties in Minnesota, most staff paid for with ENRTF funds are in classified positions hired specifically to accelerate the completion of the atlas work. Staff in these positions generally did not have and currently do not have other assignments. The positions will be vacated and the approved complement of the agency reduced accordingly once the long-term project is complete.
<b>Personnel - Hydrogeologist 2</b>		Hydrogeologist/Field Lead	<b>Classified :</b> Because the atlas program represents a longer-term project (decades) to complete an atlas for all 87 counties in Minnesota, most staff paid for with ENRTF funds are in classified positions hired specifically to accelerate the completion of the atlas work. Staff in these positions generally did not have and currently do not have other assignments. The positions will be vacated and the approved complement of the agency reduced accordingly once the long-term project is complete.

<p><b>Contracts and Services -</b> Minnesota Department of Agriculture Chemistry Laboratory</p>	<p>Professional or Technical Service Contract</p>	<p>The MDA Chemistry Laboratory provides comprehensive chemical analysis of approximately 110 groundwater samples from each county included in the atlas schedule. With ML2022 funding, groundwater from up to four counties would be analyzed by for a total of approximately 440 samples analyzed, at a total cost of approximately \$170,400</p>	<p>As a State Agency, the MDA is given preference for this contract. <b>This is a single source contract.</b></p>
<p><b>Contracts and Services -</b> University of Minnesota Chemistry Laboratory</p>	<p>Professional or Technical Service Contract</p>	<p>The UofM Chemistry Laboratory provides carbon-14 analysis of groundwater samples collected for each county to understand groundwater residence time and groundwater-surface water connections. Analytical costs are approximately \$7,600 per county, or \$30,400 for four counties.</p>	<p>This is unique laboratory analytical work not readily available from other contractors, and as a state entity, the University of Minnesota Laboratory Is given preference for this work. <b>This is a single source contract.</b></p>
<p><b>Contracts and Services -</b> University of Waterloo Chemistry Laboratory</p>	<p>Professional or Technical Service Contract</p>	<p>The University of Waterloo Chemistry Laboratory provides unique laboratory analytical service that are not readily available from other vendors for tritium and stable isotopes in groundwater. Cost per county for tritium and stable isotope analysis is approximately \$19,500, or a total cost for four counties of approximately \$78,000.</p>	<p>This is unique laboratory analytical work not readily available from other contractors. Before each new contract, the DNR requests bids for this work from state laboratories and other contract laboratories. If other labs are unable to meet the specific chemistry requirements, the DNR contracts with the University of Waterloo Chemistry laboratory. <b>This is a single source contract.</b></p>

## Non ENRTF Funds

Category	Specific Source	Use	Status	Amount
<b>State</b>				
Cash	The DNR General Funds appropriated by the legislature, and distributed by the commissioner of the DNR.	The DNR General Funds are needed to support salaries for atlas staff (~3 FTE) and related support resources for the 1-year project period to support completion of groundwater atlases.	Pending	\$600,000
			<b>State Sub Total</b>	<b>\$600,000</b>
<b>Non-State</b>				
In-Kind	In-Kind county/local government assistance through staff, resources, facilities and goods.	County/local government assistance is required to arrange water sampling access, arrange and sponsor local training workshops, field trips and training. Approximately \$4,000/county for up to four counties (total ~\$16,000)	Potential	\$16,000
			<b>Non State Sub Total</b>	<b>\$16,000</b>
			<b>Funds Total</b>	<b>\$616,000</b>

## Attachments

### Required Attachments

#### *Visual Component*

File: [f6827d78-53e.pdf](#)

#### *Alternate Text for Visual Component*

The first page is a Minnesota map which shows the status of groundwater atlases for each county as of April 2021. Counties are shaded according to their status as either, 1) not yet started, 2) complete/underway, or as 3) ML2022. This work plan includes beginning work on a groundwater atlas (groundwater sampling) for the four counties shown as ML2022: Aitkin, Lake, Otter Tail and St. Louis. Page two is a list of all eighty seven (87) counties grouped by groundwater atlas status....

### Administrative Use

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

No

**Does your project have potential for royalties, copyrights, patents, or sale of products and assets?**

No

**Do you understand and acknowledge IP and revenue-return and sharing requirements in 116P.10?**

N/A

**Do you wish to request reinvestment of any revenues into your project instead of returning revenue to the ENRTF?**

N/A

**Does your project include original, hypothesis-driven research?**

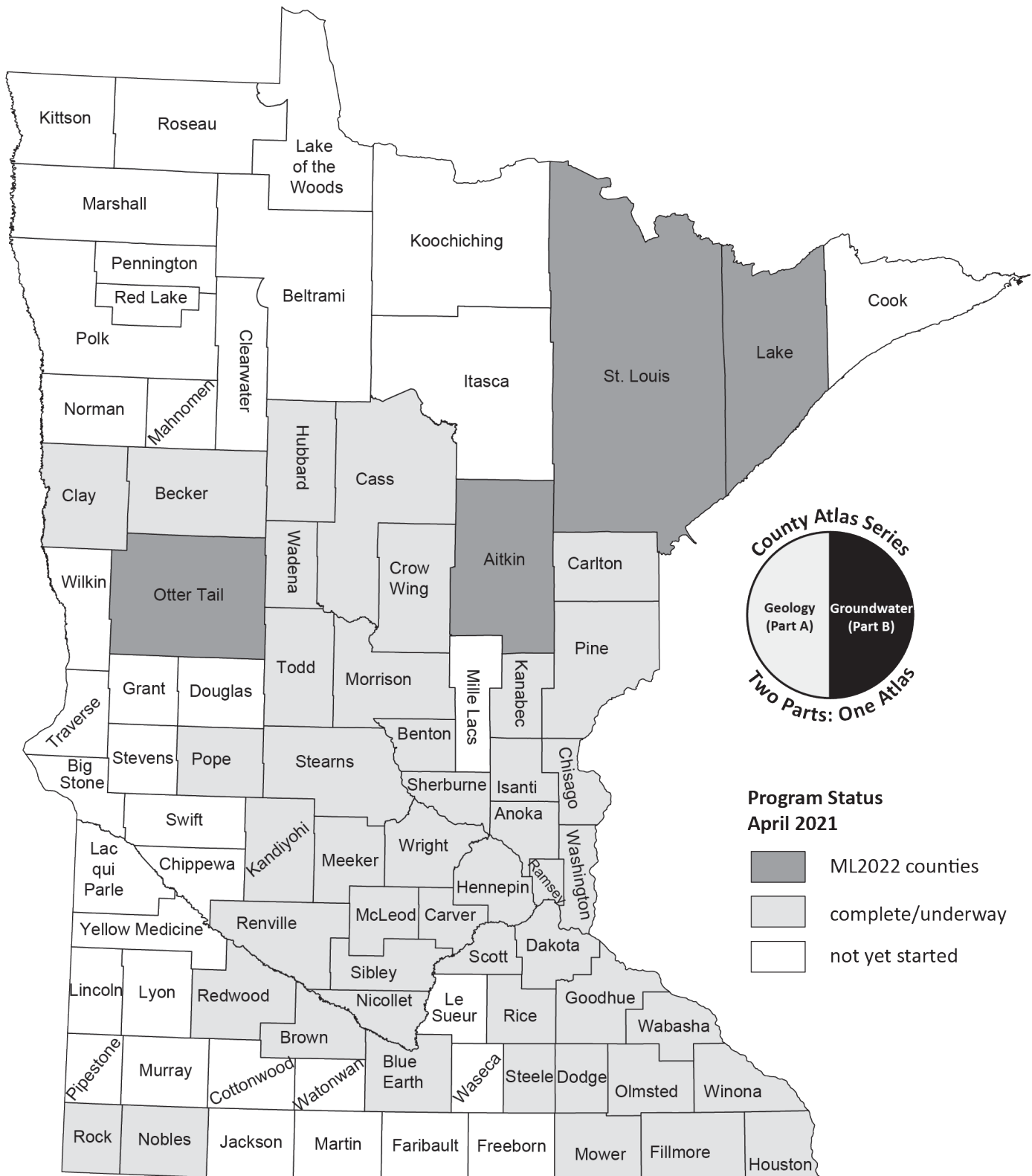
Yes

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

No

# County Groundwater Atlas

- Water supply planning • Transportation planning • Land use decisions • Agricultural water supply • Resources development • Groundwater studies • Resource protection • Government, industry, citizens • Research



**ML2022 counties (start)**

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1. Aitkin
2. Otter Tail
3. Lake
4. St. Louis

**Complete/Underway\***

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1. Anoka
2. Becker
3. Benton
4. Blue Earth
5. Brown
6. Carlton
7. Carver
8. Cass
9. Chisago
10. Clay
11. Crow Wing
12. Dakota
13. Dodge
14. Fillmore
15. Goodhue
16. Hennepin
17. Houston
18. Hubbard
19. Isanti
20. Kanabec
21. Kandiyohi
22. McLeod
23. Meeker
24. Morrison
25. Mower
26. Nicollet
27. Nobles
28. Olmsted
29. Pine
30. Pope
31. Ramsey
32. Redwood
33. Renville
34. Rice
35. Rock
36. Scott
37. Sherburne
38. Sibley
39. Stearns
40. Steele
41. Todd
42. Wabasha
43. Wadena
44. Washington
45. Winona
46. Wright

**Not yet started**

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1. Beltrami
2. Big Stone
3. Chippewa
4. Clearwater
5. Cook
6. Cottonwood
7. Douglas
8. Faribault
9. Freeborn
10. Grant
11. Itasca
12. Jackson
13. Kittson
14. Koochiching
15. Lac qui Parle
16. Lake of the Woods
17. Le Sueur
18. Lincoln
19. Lyon
20. Mahnommen
21. Marshall
22. Martin
23. Mille Lacs
24. Murray
25. Norman
26. Pennington
27. Pipestone
28. Polk
29. Red Lake
30. Roseau
31. Stevens
32. Swift
33. Traverse
34. Waseca
35. Watonwan
36. Wilkin
37. Yellow Medicine

\*Includes counties completed prior to current Part B style, and several counties are also included in prior recommended funding (ML2020, ML2021) not acted upon by Legislature at time of this proposal, so work is not started.