



# Environment and Natural Resources Trust Fund

M.L. 2020 Approved Work Plan

## General Information

**ID Number:** 2020-009

**Staff Lead:** Corrie Layfield

**Date this document submitted to LCCMR:** August 13, 2021

**Project Title:** County Groundwater Atlas

**Project Budget:** \$1,125,000

## Project Manager Information

**Name:** Paul Putzier

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

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## Project Reporting

**Date Work Plan Approved by LCCMR:** August 13, 2021

**Reporting Schedule:** April 1 / October 1 of each year.

**Project Completion:** June 30, 2024

**Final Report Due Date:** August 14, 2024

## Legal Information

**Legal Citation:** M.L. 2021, First Special Session, Chp. 6, Art. 5, Sec. 2, Subd. 03c

**Appropriation Language:** \$1,125,000 the second year is from the trust fund to the commissioner of natural resources to continue producing county geologic atlases to inform management of surface water and groundwater resources for drinking water and other purposes. This appropriation is for Part B, to characterize the potential water yields of aquifers and the aquifers' sensitivity to contamination.

**Appropriation End Date:** June 30, 2024



## Narrative

**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.

**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 every year. The challenge to balance wise-use and protection will only increase over time. Minnesota’s healthy environment, growing economy, and vibrant quality of life requires informed use, management and planning related to all the state’s natural resources, including groundwater. Industry, researchers, state and local governments and others need comprehensive and accurate information about those resources to do their jobs on behalf of all Minnesotans. The Groundwater Atlas is one important tool for professional planners, resource managers, researchers and citizens 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 appropriation will support atlas work on four or more counties depending upon completion of the Part A Atlas by the MGS and when they are provided to DNR. This appropriation may include work on Dodge, Hubbard, Olmsted, and Wadena.

The atlas is a critical tool for a broad range of resource managers. It provides comprehensive geologic and groundwater mapping, pollution sensitivity and recharge potential of aquifers, water chemistry of major aquifers, age-dating of groundwater, groundwater flow direction of key aquifers, information about surface water-groundwater interaction and associated data 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, Environmental Impact Statements and more.

**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 provide very specific and foundational natural resource data and information to a wide variety of resource managers for maintaining long-term stable water supplies for growing economies, and help protect ecological systems that rely on groundwater. Groundwater Atlases also provide information and training for future resource managers, researchers and citizens who in the decades ahead, will be grappling with the many challenges of balancing use and preservation of their groundwater resources.

## 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

## Activities and Milestones

### Activity 1: Groundwater & surface water sampling and analysis

**Activity Budget:** \$283,978

**Activity Description:**

The DNR will analyze Geologic Atlas data (from the Minnesota Geological Survey), prepare a sampling plan for up to 100 wells in each of up to four counties and selected surface water bodies, compile field chemistry; and analyze groundwater samples for natural chemistry and age-dating isotopes.

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. Mapping in northeast Minnesota may also require specialized sampling and analysis techniques.

**Activity Milestones:**

Description	Completion Date
Complete water sampling in 2 counties	June 30, 2022
Complete water sampling in 2 counties	June 30, 2023

### Activity 2: Groundwater Atlas preparation and publication

**Activity Budget:** \$781,022

**Activity Description:**

The activity includes preparing, writing and publishing atlas following data collection. The activity includes analyzing collected data (geology, water chemistry, water usage, other), preparing groundwater flow direction maps and groundwater cross sections, pollution sensitivity maps, preparing and publishing reports (hardcopy and web). This activity includes providing 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.

**Activity Milestones:**

Description	Completion Date
Preparation and publication of up to 1-2 complete County Groundwater Atlases	October 31, 2022
Preparation and publication of up to 1-2 complete County Groundwater Atlases	October 31, 2023

### Activity 3: Atlas Stakeholder Workshop & Dissemination Activities

**Activity Budget:** \$60,000

**Activity Description:**

To introduce local resource professionals to the atlas when complete, for this activity DNR will provide hands-on workshops and potentially 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. DNR will conduct other dissemination activities as detailed in that section of this work plan.

**Activity Milestones:**

Description	Completion Date
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Completion of 1-2 Groundwater Atlas Workshops and other dissemination activities for completed Atlases	December 31, 2022
Completion of 1-2 Groundwater Atlas Workshops and other dissemination activities for completed Atlases	December 31, 2023

## Dissemination

### **Describe your plans for dissemination, presentation, documentation, or sharing of data, results, samples, physical collections, and other products and how they will follow ENRTF Acknowledgement Requirements and Guidelines.**

At the completion of a Groundwater Atlas for a county, DNR provides direct personal notification to county partners of the availability of the atlas. DNR also notifies LCCMR staff and approximately 4,000 email recipients (listserv: <http://www.dnr.state.mn.us/emailupdates>) who have signed up to receive such notifications. DNR uses official news releases that are picked up by media outlets across the state, and targeted news releases to county media. Additional dissemination outlets include articles or updates in newsletters for organizations such as the Legislative Water Commission, Association of Minnesota County's, the Minnesota Ground Water Association, internal DNR agency news releases, and presentations at technical and local conferences across Minnesota.

Each completed atlas is printed in paper format and distributed to the county, libraries, state agencies, and other organizations. County representatives are provided with up to 200 paper (hard) copies of the final atlas to distribute to local stakeholders at no charge. Project data, including water chemistry data and GIS data are available on the DNR web site. Water chemistry data are also incorporated into the interagency EquiS database that can be used by all state government entities. PDF versions of the complete report are posted to the DNR web site: [https://www.dnr.state.mn.us/waters/groundwater\\_section/mapping/status.html](https://www.dnr.state.mn.us/waters/groundwater_section/mapping/status.html).

Following the publication of each atlas, a local workshop is held to introduce the report contents and train users in its application. County representatives host the workshop, inviting interested parties. Real-life exercises based on the specific groundwater resources of the county are used to walk stakeholders through the use of the comprehensive information provided in the CGA for their county. Following dissemination and the local workshop, DNR staff are available to the counties and others to answer questions and assist in the continued application and use of the atlas.

The Minnesota Environment and Natural Resources Trust Fund (ENRTF) is acknowledged through use of the trust fund logo or attribution language on project print and electronic media, publications, signage, and other communications per the ENRTF Acknowledgement Guidelines.

## 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 county and local 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 (HG-01) & Near Surface Materials (HG-02), 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	M.L. 2015, Chp. 76, Sec. 2, Subd. 03b	\$2,000,000

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
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## 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	\$70,000
Research Scientist/Hydrogeologist		Chief Author/Senior Technical			20%	1	X	\$140,000
Hydrogeologist 3		Hydrogeologist/Lead Author			20%	1	X	\$125,000
Hydrogeologist 2		Hydrogeologist/Author			20%	1	X	\$114,000
Hydrogeologist 2		Hydrogeologist/Author			20%	0.5	X	\$57,000
Hydrogeologist 2		Hydrogeologist/Author			20%	0.5	X	\$57,000
Hydrogeologist 2/Engineer		Hydrogeologist/Author			20%	0.5	X	\$57,000
Hydrogeologist 1		Hydrogeologist/Fieldwork Lead			20%	0.5		\$43,976
Information Officer 2		Technical Editor			20%	0.5	X	\$45,000
Research Analyst Senior		Lead GIS			20%	0.5	X	\$48,000
							<b>Sub Total</b>	<b>\$756,976</b>
<b>Contracts and Services</b>								
Minnesota Department of Agriculture Chemistry Laboratory	Professional or Technical Service Contract	MDA Laboratory provides comprehensive chemical analysis of approximately 110 groundwater samples from each county included in the atlas schedule. With this funding, groundwater from four counties would be analyzed by the MDA for approximately 440 samples analyzed, at a total cost of approximately \$142,000.		X		1		\$142,000
University of Minnesota Chemistry Laboratory	Professional or Technical Service Contract	UM 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 \$7,000 per county, or \$28,000 for four counties.		X		0.1		\$28,000
University of Waterloo	Professional or Technical Service Contract	The University of Waterloo provides unique laboratory analytical service that are not readily available from other vendors for tritium and stable isotopes in groundwater. Cost per county		X		0.2		\$66,000



		for tritium and stable isotope analysis is approximately \$16,500, or a total cost for four counties of approximately \$66,000						
							<b>Sub Total</b>	<b>\$236,000</b>
<b>Equipment, Tools, and Supplies</b>								
	Tools and Supplies	Supplies, including expendable water sampling supplies (Approx. 440 samples total. \$30/sample: high volume microfilters; valves and tubing for each well sampled, titration supplies (est \$12,500). 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.					\$13,500
	Equipment	Non-capital equipment including: water sampling and measurement tools and field analytical meters and equipment (est \$7,500 total for replacement multiple, individual meters: Trimble, Hack water quality meters, Rugged Pro field probes and titrate system).	Necessary equipment and instruments for groundwater sampling.					\$7,500
							<b>Sub Total</b>	<b>\$21,000</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 \$13,500) and travel expenses (est \$13,478), primarily for water sampling and field data collection in up to four counties. All travel per DNR travel policy.	Groundwater sampling in up to four counties.					\$26,978
							<b>Sub Total</b>	<b>\$26,978</b>
<b>Travel Outside Minnesota</b>								
							<b>Sub Total</b>	-
<b>Printing and Publication</b>								

	Printing	Each Groundwater Atlas includes printing (off-set and digital) of approximately 200 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 includes preparing 1,000 post cards for each county and postage to mail to citizens to obtain permission for water well sampling. Total anticipated per county printing costs estimated to be \$9,000. Printing costs for four (4) county atlas estimated to be \$36,000.	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 and for for distribution to stakeholders and resource managers. Postage costs are included for post cards and sending copies of the atlas to stakeholders.					\$36,000
							<b>Sub Total</b>	<b>\$36,000</b>
<b>Other Expenses</b>								
		*Direct and Necessary expenses: HR Support (~\$9,962), Safety Support (~\$1,803), Financial Support (~\$10,061), Communication Support (~\$1,388), IT Support (~\$23,695), and Planning Support (~\$1,138) necessary to accomplish funded programs/projects.	*Direct and Necessary Expenses includes all Department Support Services.					\$48,046
							<b>Sub Total</b>	<b>\$48,046</b>
							<b>Grand Total</b>	<b>\$1,125,000</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 each county, 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 canceled and the approved complement of the agency reduced accordingly once the appropriation has been spent.
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 each county, 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 canceled and the approved complement of the agency reduced accordingly once the appropriation has been spent.
Personnel - Hydrogeologist 3		Hydrogeologist/Lead Author	<b>Classified</b> : Because the atlas program represents a longer-term project (decades) to complete an atlas for each county, 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 canceled and the approved complement of the agency reduced accordingly once the appropriation has been spent.
Personnel - Hydrogeologist 2		Hydrogeologist/Author	<b>Classified</b> : Because the atlas program represents a longer-term project (decades) to complete an atlas for each county, 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 canceled and the approved complement of the agency reduced accordingly once the appropriation has been spent.
Personnel - Hydrogeologist 2		Hydrogeologist/Author	<b>Classified</b> : Because the atlas program represents a longer-term project (decades) to complete an atlas for each county, 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 canceled and the approved complement of the agency reduced accordingly once the appropriation has been spent.
Personnel - Hydrogeologist 2		Hydrogeologist/Author	<b>Classified</b> : Because the atlas program represents a longer-term project (decades) to complete an atlas for each county, 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 canceled and the approved complement of the agency reduced accordingly once the appropriation has been spent.
<b>Personnel</b> - Hydrogeologist 2/Engineer		Hydrogeologist/Author	<b>Classified</b> : Because the atlas program represents a longer-term project (decades) to complete an atlas for each county, 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 canceled and the approved complement of the agency reduced accordingly once the appropriation has been spent.
<b>Personnel</b> - Information Officer 2		Technical Editor	<b>Classified</b> : Because the atlas program represents a longer-term project (decades) to complete an atlas for each county, 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 canceled and the approved complement of the agency reduced accordingly once the appropriation has been spent.
<b>Personnel</b> - Research Analyst Senior		Lead GIS	<b>Classified</b> : Because the atlas program represents a longer-term project (decades) to complete an atlas for each county, 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 canceled and the approved complement of the agency reduced accordingly once the appropriation has been spent.
<b>Contracts and Services</b> - Minnesota Department of Agriculture Chemistry Laboratory	Professional or Technical Service Contract	MDA Laboratory provides comprehensive chemical analysis of approximately 110 groundwater samples from each county included in the atlas schedule. With this funding, groundwater from four counties would be analyzed by the MDA for approximately 440 samples analyzed, at a total cost of approximately \$142,000.	As a State Agency, the MDA is given preference for this contract. <b>This is a single source contract.</b>
<b>Contracts and Services</b> - University of Minnesota Chemistry Laboratory	Professional or Technical Service Contract	UM Chemistry Laboratory provides Carbon-14 analysis of groundwater samples collected for each county to understand groundwater residence time and groundwater-	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>surface water connections.</p> <p>Analytical costs are approximately \$7,000 per county, or \$28,000 for four counties.</p>	
<p><b>Contracts and Services -</b> University of Waterloo</p>	<p>Professional or Technical Service Contract</p>	<p>The University of Waterloo 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 \$16,500, or a total cost for four counties of approximately \$66,000</p>	<p>This is unique laboratory analytical work not readily available from other contractors.</p> <p><b>This is a single source contract.</b></p>

## Non ENRTF Funds

Category	Specific Source	Use	Status	Amount
<b>State</b>				
Cash	DNR General Funds appropriated by the legislature, and distributed by the commissioner of the DNR.	DNR General Funds to support salaries for atlas staff (3 FTE) and related support resources for the project period to support completion of groundwater atlases.	Pending	\$1,200,000
			<b>State Sub Total</b>	<b>\$1,200,000</b>
<b>Non-State</b>				
In-Kind	In-Kind county/local government assistance through staff, resources, facilities and goods.	County/local government assistance to arrange water sampling access, arrange and sponsor local training workshops, field trips and training. Approximately \$4,000/county for up to four counties.	Pending	\$16,000
			<b>Non State Sub Total</b>	<b>\$16,000</b>
			<b>Funds Total</b>	<b>\$1,216,000</b>

## Attachments

### Required Attachments

#### *Visual Component*

File: [b577e711-ad7.pdf](#)

#### *Alternate Text for Visual Component*

The Minnesota map shows the status of groundwater atlases for each county as of July 2021. Counties are colored according to their status as either, 1) not yet started, 2) complete/anticipated completion, or as 3) 2020-009 counties. This appropriation includes work on portions of a groundwater atlas for the four counties shown as 2020-009 counties: Dodge, Hubbard, Olmsted and Wadena...

### Optional Attachments

#### *Support Letter or Other*

Title	File
2020-009 Background Check Certification	<a href="#">0e1f35f7-412.pdf</a>

## Difference between Proposal and Work Plan

#### *Describe changes from Proposal to Work Plan Stage*

DNR added more detailed activities and milestones per LCCMR staff recommendations. The activities and milestones had to be revised to account for overlapping appropriations (2020-009, 2021-071) resulting from the legislative process in 2020/2021. The dissemination section was added and small updates were made to the text of other sections. We selected state-wide work and impacts from new drop downs because our plans call for work across the state and we update statewide coverages (near surface and bedrock sensitivity and water table) every time a new county atlas is completed. No changes to budget or scope were made. Added the Background Certification form (8/2/2021).

## Additional Acknowledgements and Conditions:

The following are acknowledgements and conditions beyond those already included in the above workplan:

**Do you understand and acknowledge the ENRTF repayment requirements if the use of capital equipment changes?**

N/A

**Do you agree travel expenses must follow the "Commissioner's Plan" promulgated by the Commissioner of Management of Budget or, for University of Minnesota projects, the University of Minnesota plan?**

Yes, I agree to the Commissioner's Plan.

**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

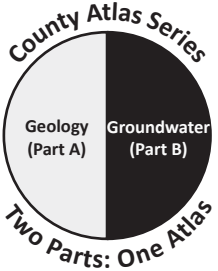
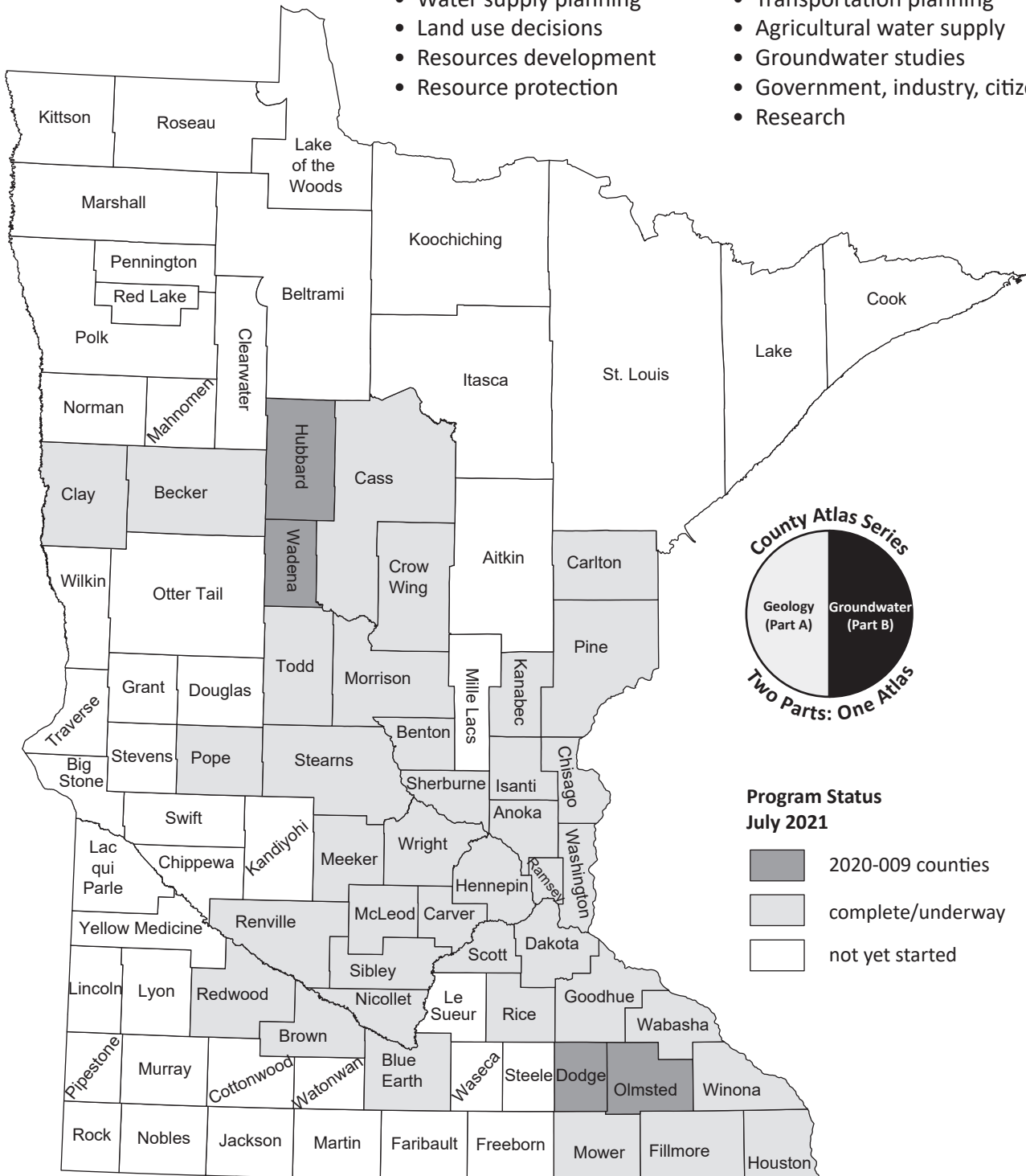
**Does the organization have a fiscal agent for this project?**

No



# County Groundwater Atlas

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



**Program Status  
 July 2021**

- 2020-009 counties
- complete/underway
- not yet started

