Water Quality Testing in Eau Claire County's Private Wells

An Assessment of Waterborne Contaminants

We acknowledge that the University of Wisconsin-Eau Claire occupies the sacred and ancestral lands of Indigenous Peoples. We honor the land of the Menominee, Ho-Chunk, Potawatomi, Ojibwe, and Dakota Nations.

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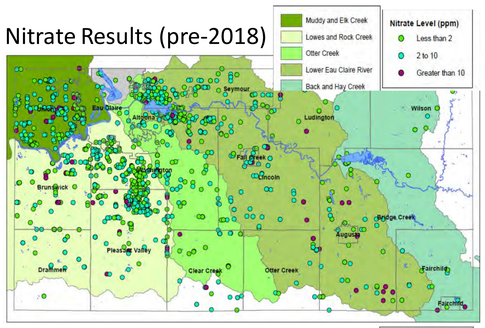
Introduction

The goal of this study is to better understand groundwater quality and contaminant concerns in rural areas of Eau Claire County, WI to make informed decisions about drinking water regulations. Roughly 9,000 private wells provide drinking water to 25% of the population of Eau Claire County. These wells are not required to be routinely tested, unlike municipal wells, and thousands of these wells remain untested every year. The Eau Claire City-County Health Department, the Department of Public Health and Environmental Studies and the Department of Geology and Environmental Science are working collaboratively to recruit and contact homeowners to arrange tap water sampling. Each sample is tested for nitrate, total bacteria, E. *coli*, copper, lead, arsenic, manganese, and hardness. To date, 62 samples have been collected since Summer 2023.

Nitrate Results (pre-2018)



Coliform Bacteria Results (pre-2018)

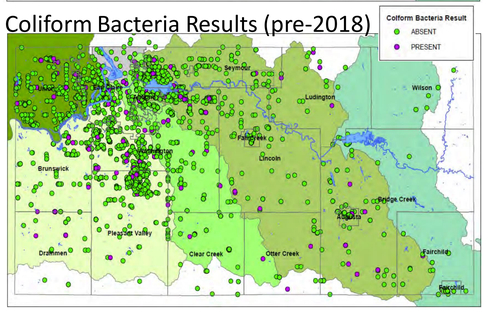
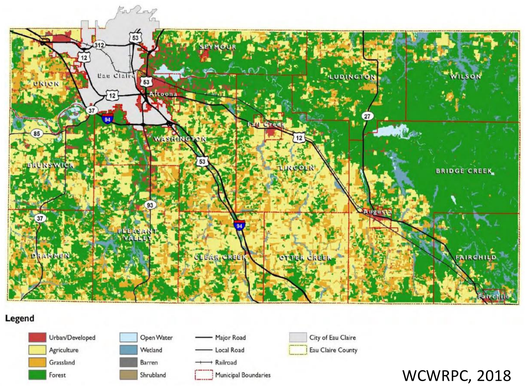


Fig 1 (left). The maps show Eau Claire City-County Health Department nitrate and coliform bacteria results from samples collected prior to 2018. A previous study of nitrate by Suppes et al., 2022 contributed to the data displayed here. Note that nitrate concentrations are most elevated in the western half of the county, and the watersheds with the highest nitrate averages are Muddy and Elk Creek, and the Lower Eau Claire River. Nitrate <2mg/L is considered to be naturally-occurring.

Fig 2 (right). The map shows Eau Claire County land cover. The eastern portion of the county is dominated by forest, with the majority of agricultural land located in the central and southern portions of the County.



WCWRPC, 2018

Methods and Materials

Letters were mailed to homeowners with private wells to seek permission for water testing. Sites were selected based on homeowner permission, and samples were collected from unfiltered taps using bottles provided by the Eau Claire City-County Health Department. The procedure for sampling includes:

- Flaming outdoor taps with a butane lighter to kill bacteria (prevents cross-contamination)
- Running the water for 2-15 minutes to flush water out of the pipes
- Adjusting the water to form a smooth pencil-width stream
- Collecting 2 water samples

Samples were transported to the Eau Claire City-County Health Department within 24 hours of collection. Samples were analyzed for copper, lead, coliform bacteria, nitrate, arsenic, manganese, iron, and water hardness. Results and Health Department recommendations are sent to the homeowners.

Fig 3. Student flaming tap of pressure tank.

Fig 4. Student collecting a water sample from outdoor tap.

Fig 5. Processing and analysis of private well water samples at the Eau Claire City-County Health Department.

Results and Discussion

Once all data have been collected, groundwater quality will be analyzed relative to geographic distribution, geology, and well construction. All data are stored in the Eau Claire City County Health Department database and will be used to inform decision making related to drinking water resources.

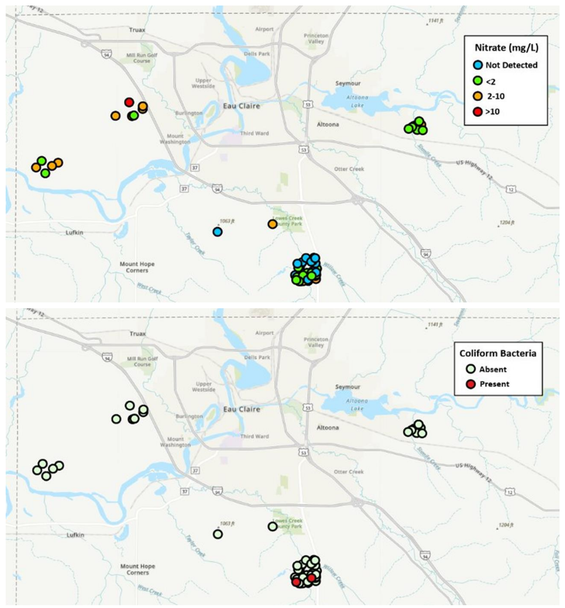


Fig 6. Maps of current results for bacteria and nitrate for sites in the northwest portion of Eau Claire County. Nitrate >2 mg/L indicates unnatural influence (agriculture, septic). The presence of coliform bacteria is not typically a function of the groundwater quality, but usually due to surface water contamination in a private well.

Table 1. Drinking water advisory level and % of water samples exceeding the advisory level for samples collected to date.

Contaminants	Drinking Water Advisory Level	% Samples Exceeded
Coliform Bacteria	Absent	5.26%
E. coli	Absent	0%
Nitrate (mg/L)	10.0	1.75%
Arsenic (µg/L)	10.0	0%
Copper (µg/L)	1300	12.28%
Lead (µg/L)	15.0	10.53%
Manganese (µg/L)	300	12.28%

Acknowledgements

We thank the Eau Claire County residents who volunteered to participate in this study, and we appreciate their ongoing participation. We thank the Eau Claire City-County Health Department for providing supplies and testing these samples. We thank undergraduate students in the Geology & Env Sciences and Public Health & Environmental Studies Departments for participating in sampling. We thank and acknowledge the Eau Claire County Groundwater Advisory Committee for their guidance in the design of this study. We thank Dr. Sarah Vitale and Dr. Laura Suppes for the education and guidance in this ongoing research. We thank the UWEC Department of Geology & Environmental Science for supplies and transportation.

References

Suppes, L., Boerner, A., Sanderson, S., Johnson, T., and Vitale, S., 2022, Source Investigations of Nitrate Contamination for Private Wells in Eau Claire County, Journal of Environmental Public Health.
WCWRPC, 2018, Eau Claire County Economic Profile, http://wcwrpc.org/Our-Counties.html, accessed 2022.

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