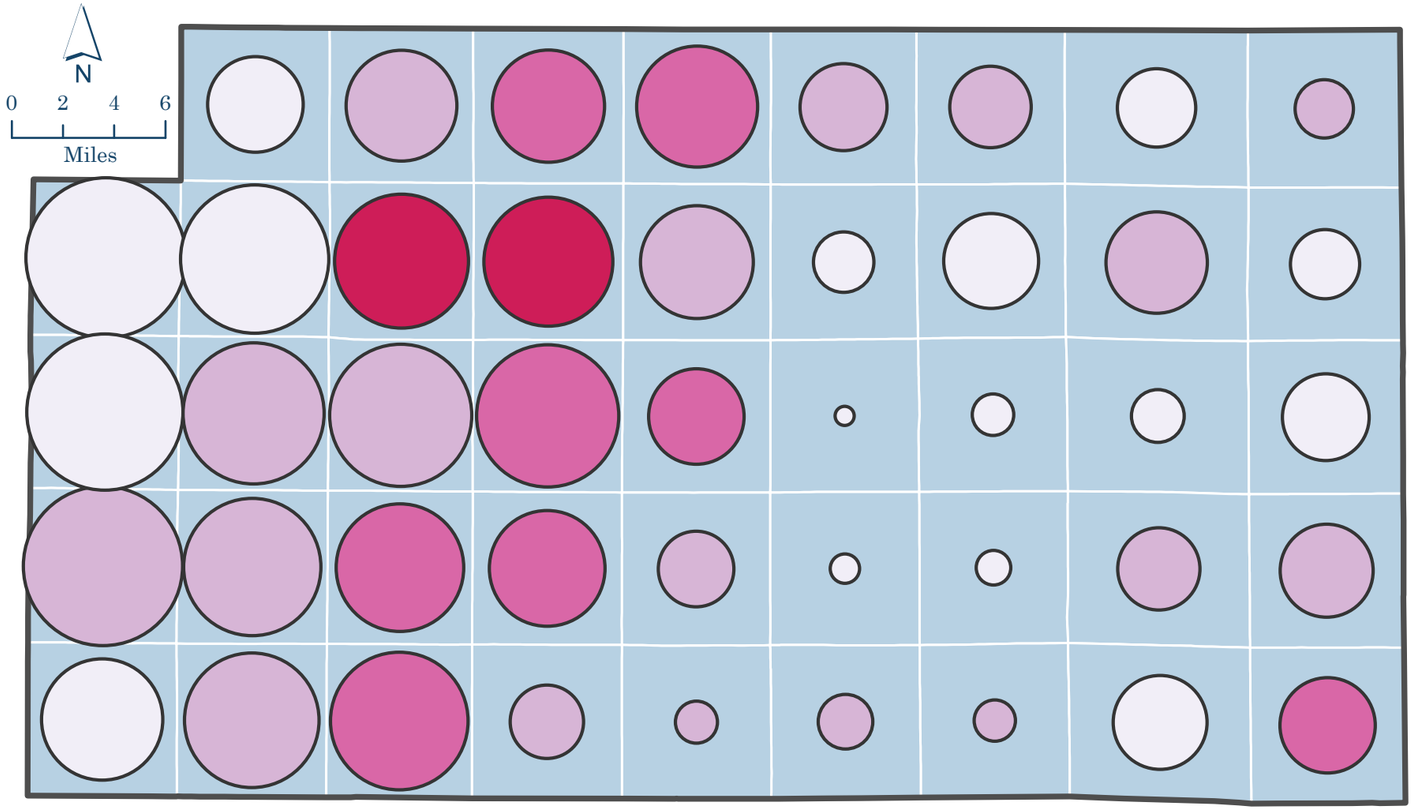
Nitrate-N Contamination of Groundwater in Marathon County, Wisconsin



What is Nitrate-N?

Nitrate is Wisconsin's most widespread contaminant in water. Nitrate-N, or nitrate as nitrogen, refers to the mass of the nitrogen contained in the nitrate (NO_3).
10 mg/L (or 10 ppm) is the maximum amount of Nitrate-N determined to be safe to ingest.

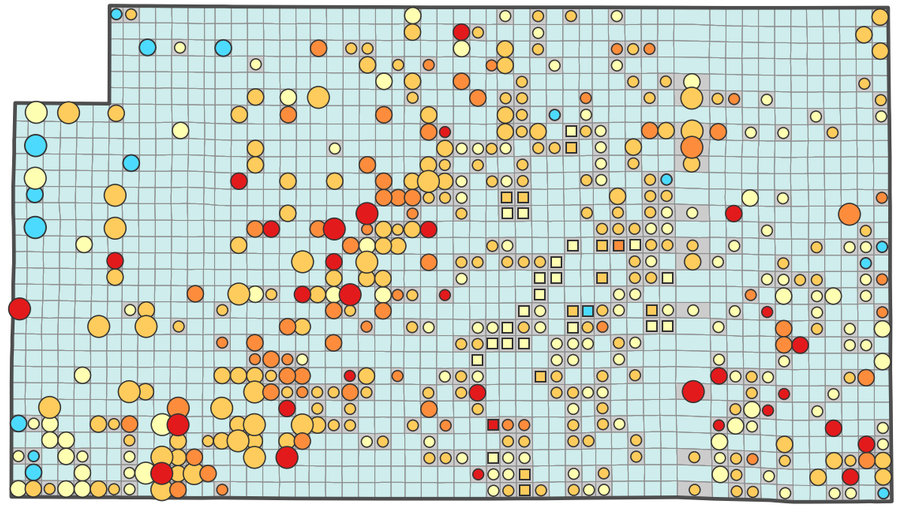
Where does Nitrate-N in groundwater come from?

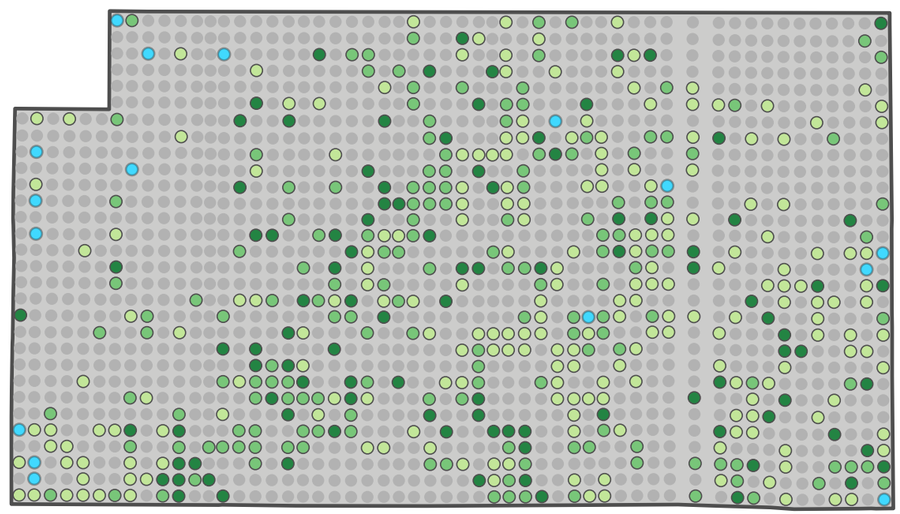
- Agricultural and Turf Fertilizers
- Animal Waste
- Septic Systems
- Waste Water

Approximately 90% of nitrogen contamination in Wisconsin comes from agricultural sources, as stated by the Wisconsin Groundwater Coordinating Council.

Agricultural Land Per Section (acres)
- > 400 – 638
- > 200 – 400
- > 0 – 200
- 0

Average Nitrate-N Level Per Section (mg/L)
- > 10 – 27.8
- > 6 – 10
- > 2 – 6
- .028 – 2
- No Nitrate detected
- No Nitrate Data (may contain agricultural land)





Agricultural Land Per Town-Range (acres)
- 14,536
- 5,000
- 1,000
- 353

Average Nitrate-N Level Per Town-Range (mg/L)
- > 7 – 8.1
- > 5 – 7
- > 3 – 5
- 1.2 – 3

Why is Nitrate-N contamination a concern?

Human Health Concerns:

According to the Wisconsin Department of Health Services, high nitrate levels should not be ingested due health risks including the following:
- Blue Baby Syndrome–nitrate can cause methemoglobinemia, or blue baby syndrome, due by a decreased amount of oxygen; infants under 6 months old are especially at risk
- Birth Defects–high nitrate levels have been linked to birth defects such asneural tube defects
- Thyroid Disease–nitrate can hinder thyroid functions by blocking its iodine intake
- Colon Cancer–nitrate may increase the potential of colon cancer, both by increasing the danger of other compounds and by changing into other chemicals

Biotic Concerns:

High nitrate levels can also pose environmental issues such as health concerns, including death, for water-dwelling animals such as fish, amphibians, and invertebrates (Wisconsin Groundwater Coordinating Council).
Nitrate contamination carried downstream to the Gulf of Mexico have also been found to contribute to harmful algea blooms which can cause dead zones due to oxygen deficieny and chemical effects (Wisconsin Public Radio).

Maximum Measured Nitrate-N Level Per Section (mg/L)
- > 10 – 65.5
- 5 – 10
- < 5
- No Nitrate Detected
- No data

Map by Mackenzie "Kenz" Carlton
Mapping date: Fall 2021
Created in consultation with UW-Steven's Point Groundwater Project 2021 student group
Data from the Center for Watershed Science and Education of University of Wisconsin - Stevens Point: Nitrate Data by Section, Nitrate Data by Town- Range, accessed 11/23/21, 11/29/21 via figshare.com, uwsp.edu Well Water Quality Viewer; Wisconsin State Cartographer's Office: Scobase WI PLSS Sections 24k, Scobase WI PLSS Townships 24k, Pronounce Counties, accessed 11/18/21 via wisc.carto.com; Wisconsin DNR: Wiscland 2 (level 1), accessed 11/30/21 via WI DNR Open Data; GeoData@Wisconsin: Wisconsin State 24k, Wisconsin Counties 24k, accessed 11/4/21; Wisconsin Groundwater Coordinating Council Report to the Legislature - 2021, PDF document; Wisconsin Department of Health Services: "Nitrate in Private Wells," accessed 12/13/21 via https://www.dhs.wisconsin.gov/water/nitrate.htm; Wisconsin Public Radio: "Nitrates in Wisconsin Groundwater, and Why the DNR Dropped Its Plan for Standards," accessed 12/13/21 via https://www.wpr.org/listen/1884756
North America Lambert Conformal Conic: central meridian at -89.75, standard parallels at 44.8, 45.1; North America Lambert Conformal Conic: central meridian at -90, standard parallels at 44, 45.5