

## Nitrates in Wisconsin Waters - A Wisconsin's Green Fire Policy Analysis

July 16, 2019



### Summary

Wisconsin needs to address the sources of nitrate pollution in drinking water, which is a growing problem around the state. End-of-pipe water supply treatment and well replacement can be short term fixes for households and communities with nitrate contaminated water, but they do nothing to address the source of the problem. It will be more cost effective and more beneficial for the health and quality of life of Wisconsin residents if we tackle nitrates at the source. **Wisconsin needs a drinking water solution equal to the magnitude of the problem. This paper lays out elements of that solution.**

### Background

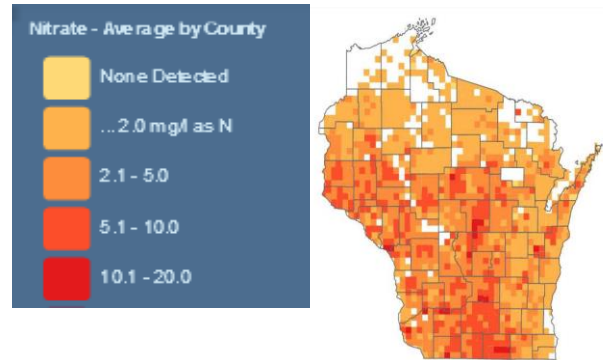
While Wisconsin has among the finest freshwater resources in North America, an increasingly large number of Wisconsin communities, homes, schools, and businesses find their water sources unsafe to drink. The water crisis in Flint, Michigan was a wake-up call about the hazards of water supplies we once assumed would always be safe. The total scope of the water quality crisis in Wisconsin today is much larger however than one community or one region. Nitrate, the most pervasive contaminant of Wisconsin groundwater, exceeds safe drinking water standards in tens of thousands of homes, hundreds of schools and businesses, and dozens of communities, profoundly affecting the health of our children, our communities, and our economy. The costs of nitrate pollution are measured in altered lives, medical bills, well and water treatment costs, lost business, and lower property values.

Water treatment and well replacement do not deal with the causes of nitrate contaminated drinking water. Even for the limited benefits they provide, the cost of end-of-pipe treatments will be far more expensive as nitrate pollution intensifies and the number of homes, schools, and businesses with unsafe water grows.

**Wisconsin needs to tackle nitrates at the source.**

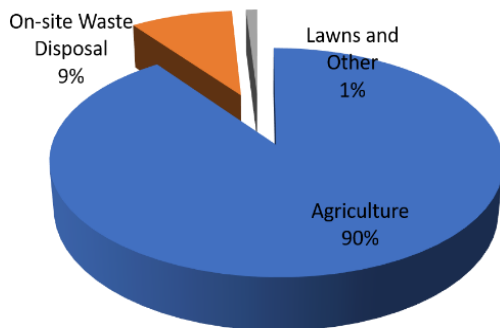
## What We Know

Elevated Nitrate levels in drinking water are a long-known cause of health risks in infants including birth defects and methemoglobinemia (blue-baby syndrome). More recent evidence makes clear however that elevated nitrate levels pose health risks for adults of all ages. Health effects associated with nitrate exposure include hematologic disorders, cardiovascular disorders, elevated cancer risks including bladder, ovarian, and thyroid cancers.



*Map of Nitrate Well Water Concentration by Township. UW-Stevens Point, Center for Watershed Science and Education. White areas on map indicate no data.*

Although current federal and state limits for drinking water indicate 10 mg/l as a threshold level, increasing evidence suggests that health impacts may occur from exposure at levels below 10 mg/l.



*Sources of Nitrates in Wisconsin's Groundwater. Wisconsin Groundwater Coordinating Council.*

About 90% of the nitrate in groundwater in Wisconsin comes from the application of nitrogen containing fertilizers, manure, and biosolids (municipal, industrial, and septic “sludge”) to crop fields. Less than 10% of the nitrate in groundwater is attributed to private on-site waste treatment systems. Farmers now apply 5 times more nitrogen fertilizer than they did in 1960, boosting crop yields but also increasing nitrate contamination of groundwater. On average,

about 20% of applied nitrogen leaches through the soil to groundwater, enough to frequently exceed the state’s 10 mg/l health standard.

### **We know enough about the causes of nitrate pollution to create intelligent solutions.**

Wisconsin farm producers, conservationists, and community leaders have the skills and willingness to help solve one of our most challenging environmental problems. **State government needs to provide the policies and resources to allow them to meet that challenge.**

## Wisconsin's Green Fire Recommends

### I. **Boost nutrient management planning and implementation AND strengthen the existing nutrient standards.**

Only 37% of Wisconsin's 10 million acres of cropland are estimated to currently have nutrient management plans (NMPs), despite 16 years of effort toward 100% adoption. The rate of actual implementation of NMPs that do exist is mostly unknown, although some estimates have suggested that actual compliance with existing NMPs is as low as 15%.

Nitrogen recommendations from fertilizer dealers are often much higher than the recommendations used in the nutrient management standards developed by UW-Extension, and often either do not account for additional nutrients supplied from manure, or discount them significantly. NMPs are often ignored by dealers supplying nitrogen to farms, as well as by manure haulers, though the extent of this problem is also unknown. Better implementation of the current nutrient management standard would decrease nitrogen loading to groundwater, especially where poor nitrogen crediting of manure and other nitrogen sources leads to gross over-application.

**The observed decline in water quality and widespread increase in nitrate contamination in Wisconsin indicates two linked problems.** One is that the current primary mechanism to protect water quality on agricultural land, the nutrient management standard, is not being followed effectively on many farms. A second related problem is that the current standards in many areas are not stringent enough, even to the extent that they are followed.

In Northeast Wisconsin, high rates of claimed nutrient management adoption have not stemmed nitrate or pathogen contamination of groundwater. Those findings spurred the adoption of more stringent nutrient management requirements in Kewaunee County.

#### **Three related strategies are needed to address the problems with nutrient management:**

- Implement a combined effort by University of Wisconsin Extension (UWEX) and the Department of Agriculture Trade and Consumer Protection (DATCP) to perform a statewide survey of actual nutrient management practices to illuminate rates of both plan development and plan implementation.
- Relevant agencies should create a strong incentive and a date certain to target full implementation of NR 151 Wisconsin Administrative Code or NMP coverage. State and federal cost sharing should be contingent on actual NMP implementation, and not just the existence of a plan.
- Wisconsin Department of Natural Resources (WDNR), DATCP and UWEX should collaborate a campaign to ensure improved implementation of the existing standard, and to work together to develop more stringent standards where needed.

## II. Revise current agricultural nutrient management recommendations to ensure that groundwater is protected and remains safe for users.

The current nitrogen application guidelines (A2809) from the University of Wisconsin – Extension (UWEX) are primarily tied to agronomic profitability and in many cases are not adequate to limit groundwater contamination below safe levels. In high-risk areas (including, but not limited to, areas of shallow or sandy soil, or areas with porous bedrock), compliance



Flooded fields after manure spreading can quickly carry nitrogen and other nonpoint source pollution to the groundwater. *Photo: Marty Nessman, DNR.*

with existing nutrient management guidelines is by itself insufficient to protect water quality.

We know that groundwater protection practices such as crop rotation, cover crops, managing nitrogen application sources, application timing, and application rates helps reduce nitrogen loading into water, although we need to better understand the precise magnitude of benefits from those practices.

### To protect our water with effective and appropriate nutrient standards, we need to:

- Revise the A2809 University of Wisconsin – Extension Nutrient Management Guidelines to incorporate limitations that will ensure that nutrient applications at the farm level will be protective of groundwater standards.
- Develop a “speedometer” for nitrogen management that tells us how much nitrate per year we are loading to groundwater for certain application rates and conservation practices. The nitrate speedometer should be incorporated into SNAP Plus software which is already in use to develop compliant nutrient management plans.
- Establish “speed limits” to limit nitrate loads for specific aquifers or contributing areas to water supplies to meet established environmental thresholds. Speed limits should be incorporated into targeted performance standards.
- Direct experts at the DATCP, WDNR, and UW-Extension to actively coordinate to make these changes.

**We need all of agriculture’s leaders to support the full implementation of nutrient management standards that protect water quality.**

### III. Address target areas of nitrate contamination with multi-agency working teams.

The Department of Natural Resources should be the lead agency, in collaboration with the Department of Agriculture and Department of Health Services in forming teams to address the most critical water quality problems at the local level. The agencies should assign staff and recruit federal, local, and non-profit partners to focus resources on protecting wells and water supplies for schools, workplaces, and residential areas where water quality problems are severe. The teams can provide proactive, ongoing support to affected communities and those with susceptible public water systems. **The teams should:**

- Mobilize all sources of conservation funding and technical assistance to enable land management that avoids excess nitrogen inputs.
- Assist local governments to set limits on septic system density and treatment standards to avoid excess nitrogen inputs.
- Identify and direct funds for precise wellhead delineation for public wells and make this an explicit part of all state-funded groundwater studies.
- Identify needs for new or increased technical assistance, policies, or funding.

### IV. Conduct more well testing to allow water users to make informed decisions.



Up to one third of Wisconsin homeowners on private wells have never had their wells tested for any contaminants. Well owners and water users need to be aware of and understand the health risks from nitrate contamination. We do not need more well testing to determine that nitrate gets into groundwater from land uses. However, given the extraordinarily high percentages of wells in recent studies that test above safe levels for nitrates or other contaminants, much wider and routine testing of private wells is a public health imperative.

**To better understand the scope of nitrate problems and protect water users we need to:**

- Expand existing county/Wisconsin Geological and Natural History Survey (WGNHS) groundwater sampling programs to understand the extent of problems, and spur action.
- Include a requirement for well testing at the time of property transfer.
- Require groundwater monitoring of manure land-spreading practices through Wisconsin Pollutant Discharge Elimination System (WPDES) permits.
- Engage University of Wisconsin – Madison, UWEX, and other researchers to evaluate groundwater impacts of agricultural practices related to the current nitrate standard.

## V. Provide short-term remedies for users with nitrate contaminated water.

In the short-term, many users will require water filter treatment or alternate water sources in order to assure safe water for human uses, especially for families with children. **It is important however to recognize that end-of-pipe water treatment is not a sustainable or complete solution to the current water crisis.**

Treatment to remove nitrates requires specialized ion-exchange or reverse osmosis equipment - commonly available carbon-based filters are not effective. The cost to purchase and install nitrate systems is significant and ongoing costs include regular maintenance and media replacement. When operated properly, systems direct excess nitrates into household wastewater and back into the groundwater. When operated improperly or not maintained, nitrate treatment systems can actually increase household nitrate levels. Families in non-owner occupied housing may be especially at risk from improperly maintained treatment systems.



Many water users with contaminated wells will need to replace their wells or deepen existing wells to improve water quality, however well replacement is prohibitively expensive for many homeowners. Those that do make the investment to replace or deepen a well will not always be guaranteed of enough improvement to ensure safe use.

Replacing all private drinking water wells currently known to exceed the existing nitrate standard would cost roughly **\$446 million** according to a recent WDNR estimate. As of May, 2019 however the available balance in the state Well Compensation Fund was about \$635,500, or less than 1.5% of the estimated need. The potential cost of well replacement will only grow larger as nitrate contamination

affects more water supplies each year. **Short-term strategies include:**

- Change the eligibility requirement for well compensation funding from 40 mg/l nitrate to the current safe threshold of 10 mg/l and eliminate the need for livestock use of the water supply to increase access to funding.
- Significantly increase funding available for well replacement through the Well Compensation Grant program to be equal to at least 10% of the current known replacement cost of wells that exceed safe thresholds for contaminants.
- Work with Department of Safety and Professional Services to deploy nitrate reducing Private On-site Waste Treatment systems.

**Although well replacement will be an expensive and necessary remediation measure for many water users, it is not a realistic long-term solution to nitrate contamination.** In the long term, reduction of the source of contamination, both from farming and from residential septic systems, inputs will be the most sustainable and cost-effective solution.

## ***Who Should be Responsible for Protecting Our Water?***

The widespread and increasing extent of nitrate contamination in Wisconsin's water is a profound problem that requires new tools, new investments, and new thinking to solve. **Using all our current tools and authorities is essential, but by itself will not be enough.**

Farmers who are committed to protecting soil and water by adopting better practices incur costs and risks that their competitors do not. **Farmers should not be alone in carrying the costs of protecting the water we all rely on.** Our farm economy and the quality of our natural resources are tightly linked and the stakeholders who benefit from healthy food and clean water all need to be part of any long-term solution.

We need to support Wisconsin farmers and our state's agricultural brand at a critical time by engaging the entire agricultural industry - lenders, food processors, agricultural trade groups, fertilizer dealers, nutrient applicators, and agronomists - along with local, state, and federal leaders to share responsibility and make water quality protection a priority.

**Stakeholders throughout our agricultural value chain need to be invested in solutions that share responsibility for protecting clean water while helping improve farm profitability.**

Wisconsin needs strong leadership to create a positive new vision for agriculture and environmental protection. Wisconsin's Green Fire is committed to working with the agricultural and environmental communities to help fulfill that vision.

**Developed by Wisconsin's Green Fire Cropping Practices and Water Quality Team**

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