



JILL BILLINGS
STATE REPRESENTATIVE

February 19, 2018

Chairman Mursau and Members of the Committee:

Thank you for holding a hearing on Assembly Bill 881, the Water Pollution Notification Act. This is a public health and safety bill that rests on the simple idea that everyone should know what is in their water.

This legislation is the product of an unfortunate circumstance that occurred in La Crosse County, but one that could happen anywhere throughout our state. As you will read in the written testimony submitted by James Steinhoff of the La Crosse County Health Department, a 2016 Legislative Audit Bureau report found that nitrates in the monitoring wells of a concentrated animal feeding operation (CAFO) outside of the Town of Holland were higher than the maximum accepted levels. To make matters worse, they had been in exceedance for more than a decade. However, no one had informed residents living in the area about the high pollutant readings. When – after almost a year and four open records requests – residents were alerted and encouraged to test their wells, nearly a third exceeded the maximum contaminant level (MCL) for nitrates. People in the area wondered why they had not been told about the monitoring well findings much earlier.

To ensure that this situation does not repeat itself, Sen. Jennifer Shilling and I authored AB 881, which would require the Department of Natural Resources to alert any potentially affected residents if a nearby Wisconsin Pollutant Discharge Elimination System (WPDES) permit holder violates the permit and causes an exceedance of contaminants in the water. The county affected will also be alerted so that the local health department can be ready to respond in a timely manner if necessary. The DNR would have 30 days to notify residents once a violation has been detected, a reasonable time frame that was suggested and supported by a number of county health departments across the state. In the event that the spike in pollutants could cause an immediate health risk, this legislation would require the DNR to notify residents within 24 hours, calling on the help of local health departments where appropriate.

The goal of this bill is to ensure that Wisconsinites are armed with the best possible information concerning the quality of their water. As you will see, the bill has bipartisan support because there is nothing political about protecting the people of Wisconsin from polluted water. This bill does not seek to regulate, nor does it impose any punitive measures. All the bill does is prioritize citizens' right to know that the water coming out of their faucets is safe to drink and use for cooking.

The Wisconsin Public Health Association and the Wisconsin Association of Local Health Departments and Boards, among others, support this bill. Today, I ask that you, too, join me in protecting all Wisconsinites by keeping them informed about the quality of their water.

Thank you again for holding this hearing. I am happy to answer any questions at this time.



Jennifer Shilling

WISCONSIN STATE SENATOR
32ND SENATE DISTRICT

Testimony in Support of Assembly Bill 881
Assembly Committee on Environment and Forestry
February 19, 2018

Thank you Chairman Mursau and Committee Members for the opportunity to submit testimony in support of Assembly Bill 881, also known as the Water Pollution Notification Act.

Last spring, the La Crosse County Health Department notified over 2,000 County residents that there were indicators of high levels of nitrates and bacteria in much of the private well water supply and urged them to test their wells. It was later revealed that monitoring wells in La Crosse County had shown elevated levels going as far back as 2005.

Representative Billings and I were contacted by many constituents who were understandably upset that they were not notified sooner of the risk. We were surprised to learn that the DNR is not required to notify municipalities or private well owners when there is an illegal discharge of pollutants into our state's water. This poses a health risk for families in every part of our state. High levels of nitrates in the water supply can cause health problems, especially for infants and pregnant women.

As you may know, the Department of Natural Resources regulates the discharge of pollutants to the state's surface and ground water through the Wisconsin Pollutant Discharge Elimination System (WPDES) program. These wastewater permits contain all the monitoring requirements, special reports, and compliance schedules appropriate to the facility in question. The DNR has issued WPDES permits to 293 concentrated animal feed operations (CAFOs), 322 industrial waste facilities, and 641 municipal waste facilities across the state.

Assembly Bill 881 does not impact any of the regulatory requirements for WPDES permit holders. Instead, this legislation simply requires the DNR to notify potentially affected well owners and counties when a permit holder violates the conditions of its permit, and urge residents to test their wells for nitrates and other contaminants. The DNR would have 30 days to notify the residents and affected counties, unless the pollution causes an immediate health risk. In that case, the DNR, with the help of County health departments, would be required to provide notification within 24 hours.

By informing residents about the potential contamination of their water, they are empowered to take the appropriate action to protect themselves and their families. If their wells test positive for elevated levels of contaminants, residents will be advised as to whether they should use bottled water for drinking and cooking, install reverse osmosis systems, or drill a new or deeper well.

Given the significant health risks associated with contaminated water, the Water Pollution Notification Act is a simple, commonsense approach that will help protect and strengthen our state's access to clean drinking water.

Thank you again for time and consideration of this legislation.

February 19, 2018

Testimony in Support of AB 881, notification of water pollution violations

Dear members of the Assembly Committee on Environment and Forestry:

My name is Bethany Storm. I live on a small farm in Postville, a karst region in the driftless hills. I raise animals for meat, milk and fiber as well as a variety of perennial and annual crops for my family and my community. In November, I tested my well water. It came back positive for coliform bacteria. So, I sent off a second water sample in December. Mind you, I have been sampling water as a part of my career since the 1990s. I am pretty positive that the first sample did not test positive due to human error, but we all make mistakes. The second test came back positive as well. So we began boiling our water and I called the local pump company. The company came out and verified what I already knew; the well cap is on securely; there are no obvious cracks, no earwigs had moved in. For all intents and purposes, the well is in good condition. It better be, it is only four years old.

So the pump company shocked my well with a chlorine mix. I spent hours in the cold running chlorinated water through my outdoor hydrants working hard to keep the hoses from freezing. For the next few weeks, my house smelled like a water park in the Dells and my hydrants ran red from the sediment from the rock deep within my well that dissolves easily in chemically laden conditions.

Knowing what I know as a biologist, I have to live with the fact that there may be a crack in the landscape nearby that moves surface water down into the ground where it meets a lateral fissure that connects with my well some 169 feet below the surface. My well is 250 feet deep and it is cased to 169 feet.

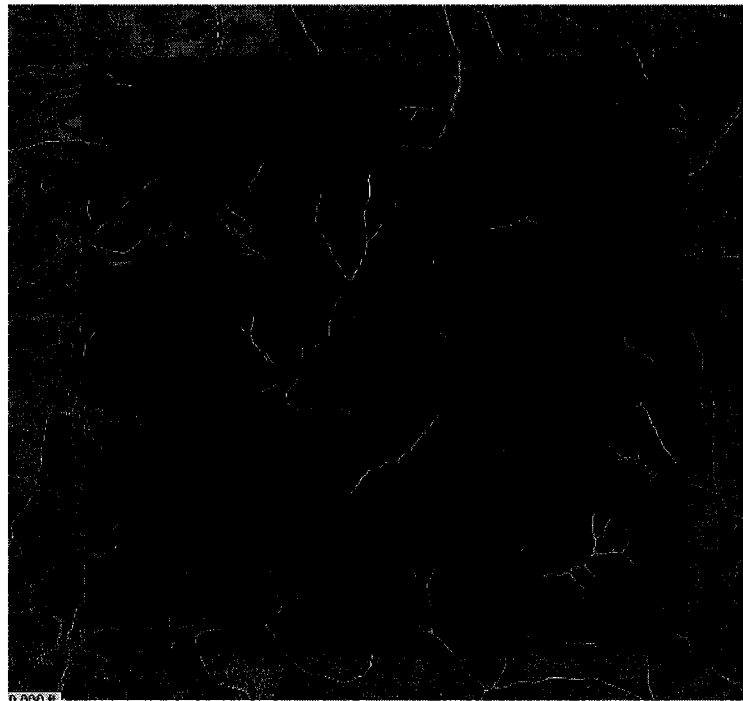
According to the NRCS-Soil Survey, more than 90% of the acreage in the Town of York has "very limited" capability of handling the agricultural disposal of manure, food-processing waste and sewage sludge. The "very limited" category in this soils inventory states "that the soil has one or more features that are unfavorable for [land spreading]. The limitations generally cannot be overcome without major soil reclamation, special design or expensive installation procedures. Poor performance and high maintenance can be expected." The State therefore must protect residents in the Town of York against excess land spreading of manure, food-processing waste and sewage sludge and alert us to spills.

I'm surrounded by farms in my tiny township of 950. For the most part, I believe the farmers in my Town do a great job as stewards of the land. They use cover crops, there

are grassed waterways and some even still farm on the contour. Unfortunately, the small farmers are still spreading their manure year round because they don't have manure storage. I believe they do the best they can and their manure is likely bed pack and not a huge threat to my well. It does worry me that the company By Tec spread their industrial waste on fields nearby as I believe a liquefied product when spread incorrectly is a threat to my groundwater. The farm across the street from me is for sale. It is big enough for a CAFO to move in and currently there is nothing in the legislature to stop it. When a CAFO moves in to a community, so does their liquefied waste stream. If the stewardship of the land changes near me, if bigger farms move in and begin to spread liquid manure on the landscape, I believe there is a good chance that my well will be contaminated again. If a spill occurs and I don't know about it, I won't be able to react quickly to keep my family safe. I will continue to test my well and do my due diligence. I am asking you today to do yours. Please move this bill forward. It is the right thing to do.

Thank you,

Bethany Storm *Green*
Postville, York Township, ~~Lafayette~~ Lafayette County



Town of York map depicting the "very limited" capability of handling the agricultural disposal of manure, food-processing waste and sewage sludge from NRCS-Web Soil Survey

AB881

TESTIMONY BY ROGER LARSON

Monday, February 19, 2018

Good Afternoon. My name is Roger Larson and I am here to register and testify in support of Assembly Bill 881 which would require the Department of Natural Resources to inform residents near large confined animal feeding operations of significant discharge permit violations of water quality or ground water standards.

Before I proceed with my testimony, please be aware of my professional qualifications. I was a registered professional engineer and worked for 32 years in the Department of Natural Resources. I retired in late 2008 as Deputy Director of the Bureau of Watershed Management. At that time the Bureau was responsible, among other programs, with statewide implementation of the discharge permit program for confined animal feeding operations. I have stayed informed regarding these issues during my retirement and I truly support my colleagues at DNR, many whom I worked with, for their tireless efforts to protect Wisconsin's water resources.

The bill, if enacted into law, will provide notice to residents that could be adversely affected by well and surface water contamination. Others have testified regarding the impacts that such large feeding lots have had on the quality of well water. This is not acceptable now and it was not acceptable when I worked for DNR. A public notification of significant violation would provide a home owner or renter near a large farm with the ability to take action to protect the health of their family members before the pollution reached them. It would also provide notice to local government to prepare actions in case of a public health emergency. To me, this bill simply is good government. It allows everyone to make informed decisions to protect their health and livelihood and will prevent future problems.

I do have one concern which is indirectly related to AB 881. The bill adds additional and worthwhile requirements to the discharge permit process that DNR staff would need to implement. Back in the early 2000s, I participated in a nationwide effort to identify staffing needs for implementation of state water quality programs. Even at that time, EPA and state staff concluded that the staff and funding resources available were not adequate to address federal and state clean water act provisions. In the last 18 years this has only gotten worse with federal and state funding cuts. These cuts, which were enacted by members of both political parties, have hamstrung efforts that DNR makes to properly permit these operations and to follow up on violations. I respectfully request that members of this committee take these staffing shortfalls seriously and address this situation in future biennial budgets.

Thank you for allowing me to testify today.

February 19, 2018
Wisconsin State Legislature
2017 Assembly Bill 881
Water Pollution Notification Act

State Assembly,

I STRONGLY URGE YOU TO PASS AR 881 TO PROTECT YOUR
CONSTITUENTS.

My family owns a 40 acre property in Ixonia in Jefferson County. The property is approximately one mile from an ever expanding CAFO located on the Rock River. This beautiful river is already on the 303d of Clean Water Impaired Water List. We are greatly concerned about the CAFO polluting the river that borders it's property. The CAFO already has 1500 cows and wants to expand to 3000. Our concern is with two huge manure lagoons that are not enclosed. What will a large spill from these lagoons do to the river?

In addition most of the homes in our community have individual wells on their property providing drinking water for those who live there. We have a right to know if there is any kind of pollution incident that may endanger the quality of our water, thus effecting the health of our families.

Wisconsin is a beautiful state. I have been proud to call this my home for over 20 years. Please support the health of our waterways by passing AR 881. We want to be informed and involved with keeping Wisconsin's environment clean for future generations.

Thank you,
Denise O'Halloran
N9246 Green Valley Rd.
Watertown, WI
53094

To the Legislators regarding Assembly Bill 881

February 19, 2018

I am writing to you as a Wisconsin taxpayer and property owner living near a CAFO in Ixonia. The CAFO is on 33 acres and is directly across the field from our house. We have concerns about the water run-off from the operation. When the second phase of the permit is in place, there will be 2865 animal units on this 33 acres. When manure is spread on the fields, there have been times when it has pooled, causing further concern. Where exactly does this liquid manure go?

We have formed a group, Defending Our Ixonia Countryside, and have gotten the DNR and the EPA involved. We are concerned about the run-off from the farm, even more so now that the farm is set to increase the number of cows. We have been educating the Ixonia residents and strongly suggesting they have their wells tested. We are more concerned than we had been with the addition of the third high capacity well on the property. What will that do to our water table? Will this also compromise our right to have clean, safe water to drink, to use?

Please put yourselves in our shoes, as if you were a neighbor living near this factory farm. Wouldn't you want to have precautions put in place? Wouldn't you want to be given a heads' up regarding water pollution violations? Think about it and do the right thing....for all the property owners in the area, not just us.

Thank you!
Very Sincerely,

Janet Foust
W993 Gopher Hill Road
Watertown, Wisconsin 53094

Written Testimony Concerning AB881

Submitted By: Dyan Pasono

Date: February 18, 2018

As a landowner in Jefferson County, **I am writing in support of Assembly Bill 881.**

My husband and I own 29 acres of rural land located within a half mile of a Concentrated Animal Feeding Operation (CAFO) with a poor history of complying with animal waste regulations as set forth by the Department of Natural Resources. This farm applies excessive amounts of manure to land throughout 3 counties and I have personally observed manure leaching into small waterways that lead into the Rock River with precipitation events. Additionally, our land abuts fields on which this CAFO owner routinely applies manure. As a result, our well is at risk of potential contamination and I feel it is extremely important that we be informed of all violations which may impact our property and the safety of our well.

We have watched the horrendous well contaminations which have taken place in other parts of our state (i.e., Kewaunee County) which were allowed to go on for years with no DNR alerts or farmers' admissions of contamination having taken place. **This needs to be corrected.**

It is time each citizen's right to clean water be taken seriously by our State Legislators and pass this bill. It is time that our State Legislators look out for the welfare of the common citizen and do what is obviously the right thing – require notification of violations that may contaminate private and public wells.

Thank you,

Dyan Pasono

N9071 Ridge Lane

Watertown, WI 53094

FAILURE AT THE FAUCET

Nitrate in water widespread, current rules no match for it

While nitrate contamination increases, experts say state's main approach unlikely to protect drinking water

By  **Kate Golden**  November 15, 2015



Erik Daily/La Crosse Tribune

Land use is a factor boosting the level of nitrate in the water in Wisconsin. In the Upper Midwest, millions of acres of grassland — which leaches little nitrogen into aquifers — have been converted into fields of corn, soy and other crops since 2008, according to University of Wisconsin-Madison researchers. Here, a farmer harvests corn near Blair in Trempealeau County.

Born a month early in the spring of 1999, Case 8 had been thriving on formula. But at three weeks old, when her family ran out of bottled water and started using boiled water from the household well at the dairy farm where they lived, she got sick.

She was just 4 pounds, 10 ounces, when her parents brought her to a Grant County emergency room. Cold, pale and “extremely blue,” she was rushed by helicopter to a regional intensive care unit.

Nearly all of her red blood cells had lost the ability to carry oxygen, according to medical records Wisconsin public health officials summarized in the Wisconsin Medical Journal.

Two days after she fell ill with methaemoglobinaemia, or “blue baby syndrome,” water tests turned up the most likely culprit — high levels of nitrate.

According to state [estimates](#)

(http://www.researchgate.net/publication/235911045_Private_Drinking_Water_Quality_in_Rural_Wisconsin),

nitrate is at unsafe levels in an estimated 94,000 Wisconsin households. One in five wells in

heavily agricultural areas is now too polluted with nitrate for safe drinking, according to data from the state Department of Agriculture, Trade and Consumer Protection.

And public water systems recorded 57 violations of health-based standards for nitrate in 2014. Those systems were required to post notices, provide bottled water, replace wells, install treatment or take other corrective actions to reduce nitrate. More than 120 of the 11,420 systems failed either to monitor or report nitrate levels.

“Nitrate that approaches and exceeds unsafe levels in drinking water is one of the top drinking water contaminants in Wisconsin, posing an acute risk to infants and women who are pregnant, a possible risk to the developing fetus during very early stages of pregnancy, and a chronic risk of serious disease in adults,” according to the 2015 Wisconsin Groundwater Coordinating Council [report](http://dnr.wi.gov/topic/groundwater/documents/GCC/GwQuality/Nitrate.pdf) (<http://dnr.wi.gov/topic/groundwater/documents/GCC/GwQuality/Nitrate.pdf>) to the Legislature.

The multi-agency council also reported that nitrate — one of the most pervasive groundwater contaminants in Wisconsin — is “increasing in extent and severity.”

Despite the signs of trouble, Wisconsin’s most recent in-depth look at blue baby syndrome is more than a decade old.

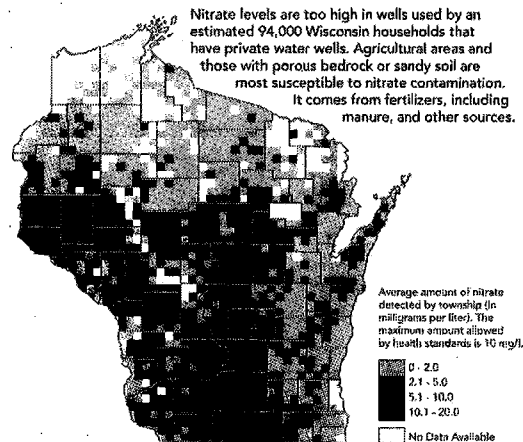
State health officials identified [eight cases](http://www.researchgate.net/profile/Lynda_Knobeloch/publication/10814458_Eight_blue_babies/links/02bfe510736ecce3b8000000.pdf)

(http://www.researchgate.net/profile/Lynda_Knobeloch/publication/10814458_Eight_blue_babies/links/02bfe510736ecce3b8000000.pdf) in the 1990s. All recovered — including Case 8, who was released from the hospital after 17 days. Generally, a baby can recover in one or two days once given clean water.

New studies have suggested even the current health standard for nitrate may be too high.

Yet blue baby syndrome is rare. That is probably because private well owners have been warned for decades to test their water, especially if they have a baby. But over the past four decades, the contamination has been worsening in extent and severity.

Nitrate in drinking water around Wisconsin



CREDIT: Katie Kowalsky/Wisconsin Center for Investigative Journalism
SOURCE: Well Water Quality Monitor, University of Wisconsin-Stevens Point, Center for Watershed Science and Education, Private Drinking Water Quality in Rural Wisconsin, *Journal of Environmental Health*, 2013.

(<https://www.wisconsinwatch.org/2015/11/nitrate-map-FINAL-2-01442194427108.png>)

Katie Kowalsky / Wisconsin Center for Investigative Journalism

Among those with water contaminated by nitrate are Sherryl and Doug Jones of rural Spring Green.

About eight years ago, water from their private well tested at 20 milligrams of nitrate per liter of water — twice the health limit. Sherryl Jones said the couple initially switched to bottled water and, since 2012, they have been using a reverse osmosis system to remove nitrate at a cost of about \$25 a month. Reverse osmosis removes nitrate and other contaminants by using high pressure to push water through a semipermeable membrane.

“We had children, we had babies in our house, we had a pregnant daughter, we had pregnant daughters-in-law. What was this (water) doing? There was no way we could let them drink this water,” Sherryl Jones recalled.

Jones said she urged neighbors to get their water tested, too. The result: Some of them had been drinking water with four times the health limit of nitrate. In fact, testing by the University of Wisconsin-Stevens Point’s Center for Watershed Science and Education found 31 percent of the private well samples collected in the Spring Green area had nitrate levels above the health standard.

Sherryl Jones said the DNR never warned them about high nitrate levels in the beautiful area along the Wisconsin River where they built their dream home. State officials have been studying dangerous nitrate levels private water wells in the Lower Wisconsin River Valley at least since the early 1990s

(<http://dnr.wi.gov/topic/groundwater/documents/GCC/MonitoringResearch/AllProjects.pdf>).



(<https://117ezp3bq1-fywhed.netdna-ssl.com/wp-content/uploads/2015/11/Copy-of-nitrate-and-phosphate-testing.jpg>)

Debra Sisk / University of Wisconsin-Stevens Point

Ian Torkelson runs a test for the presence of nitrate and phosphorous in water at the University of Wisconsin-Stevens Point’s Center for Watershed Science and Education. Nitrate from fertilizers, including animal manure, and human waste has polluted numerous wells in Wisconsin.

“They’ve known about it. Now, what have they done?” she said. “They haven’t even educated the residents of this area.”

Rules no match for nitrate

At least 90 percent of nitrate inputs into groundwater come from artificial fertilizers and manure from farming operations, according to the 2015 report of the Groundwater Coordinating Council. Nitrate in drinking water systems is increasing, the council found, and “current management activities to limit nitrate pollution have questionable effectiveness.”

In addition to blue baby syndrome, researchers are studying other possible health effects from nitrate in drinking water, including several cancers, thyroid problems, birth defects and diabetes. Nitrate can convert to compounds that are “some of the strongest known carcinogens,” according to the state groundwater council.

Nutrient management plans are the state’s main tool for addressing the problem. They help farmers apply nitrogen and phosphorus at the right rate to keep nutrients out of surface and groundwater.

“(But) nutrient management plans clearly don’t protect groundwater if we mean anything close to maintaining the drinking water standard,” said George Kraft, a professor of water resources at UW-Stevens Point who is the governor’s representative to the council.

Last year, the groundwater council made protecting groundwater from nitrate and other agricultural contaminants one of three top-priority recommendations for the state.

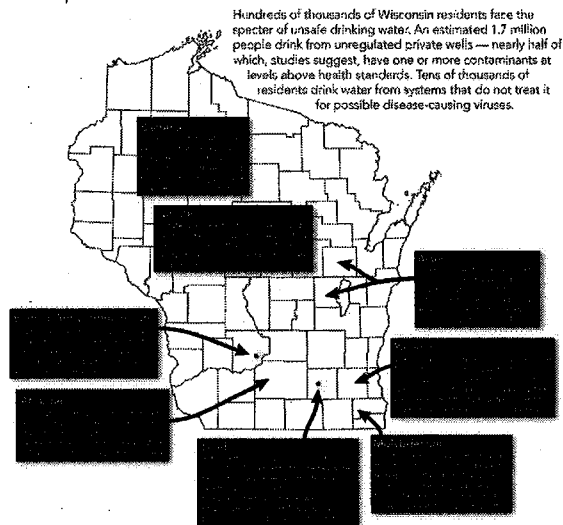
The state DNR, which is responsible for protecting groundwater, declined to provide anyone for an interview with the Wisconsin Center for Investigative Journalism about nitrate in Wisconsin's drinking water. Former agency spokesman Bill Cosh also refused to answer questions about what strategy DNR was pursuing to reduce nitrate, directing a reporter instead to previously published reports.

But DNR drinking water chief Jill Jonas acknowledged at a 2014 scientific conference on nitrogen's environmental impacts held in Madison that Wisconsin has "a worsening problem that we need to tackle."

In October, 16 Wisconsin residents, including the Joneses of rural Spring Green, [filed a petition](http://midwestadvocates.org/assets/resources/Petition%20for%20Corrective%20Action/2015-10-19_PCA_-_Signatures.pdf) (http://midwestadvocates.org/assets/resources/Petition%20for%20Corrective%20Action/2015-10-19_PCA_-_Signatures.pdf), with the U.S. Environmental Protection Agency seeking to force the DNR to correct deficiencies in its enforcement of the federal Clean Water Act.

What's in our drinking water?

Examples of contaminants across Wisconsin



CREDIT: Katie Kowalsky/Wisconsin Center for Investigative Journalism

SOURCES: "Unsafe drinking water quality in rural Wisconsin," Journal of Environmental Health, 2013; Wisconsin Department of Natural Resources; draft technical review for Wisconsin's proposed diversion of Great Lakes water, 2015; Wisconsin Department of Natural Resources; Drinking Water Database; Wisconsin Department of Agriculture, Trade and Consumer Protection website; atrazine prohibition areas; town of Menominee administrator Tim McComber.

(https://i1p2p3bq1-flywheel.netdna-ssl.com/wp-content/uploads/2015/11/overview_map-UPDATE3.png)

Katie Kowalsky / Wisconsin Center for Investigative Journalism

The petitioners allege DNR has failed to adequately protect ground and surface waters that provide drinking water to the state. The agency has responded by saying it takes its responsibilities under the law seriously.

As bad as it is now, Wisconsin's groundwater nitrate contamination overall is likely to increase long before it stabilizes, Kraft and other groundwater experts said, due to the lag time between when nitrogen is applied to the surface and when it reaches the water.

A team of researchers led by the EPA [estimated](http://iopscience.iop.org/1748-9326/10/2/025006/pdf/1748-9326_10_2_025006.pdf) (http://iopscience.iop.org/1748-9326/10/2/025006/pdf/1748-9326_10_2_025006.pdf) in 2008 that agricultural nitrate may cost the nation \$157 billion per year. Nitrate's direct damage to drinking water supplies was estimated at \$19 billion, with some of the greatest costs borne by Upper Midwest states including Wisconsin, Minnesota, Iowa, Illinois, Ohio, Michigan and Indiana. Much of the cost was attributed to a projected increase in colon cancer among those drinking contaminated water.

Jonas told the scientific conference last year that the costs of testing and treatment to remove nitrate pollution are growing statewide, “and it certainly is unsustainable.”

Dairy's role scrutinized

In a handful of recent court cases, nitrate pollution has come front and center as rural residents have challenged large livestock operations. A Wisconsin judge in 2014 cited Kewaunee County's widespread pollution of drinking water by nitrate and bacteria as evidence of “massive regulatory failure” by both federal and state agencies — a view that the DNR refutes.

Some residents there have pointed to the large dairy farms, known as concentrated animal feeding operations, as the most likely culprits for their polluted water. They have filed a separate petition (http://www.cleanwisconsin.org/wp-content/uploads/2015/01/2014-10-22-Kewaunee-SDWA-Petition-to-EPA_final.pdf) asking the EPA to provide them with emergency safe drinking water and to investigate the sources of the nitrate pollution. Many also want tighter regulation of the dairies to protect the area's vulnerable karst topography, where aquifers lie underneath shallow bedrock filled with cracks and holes.

In a case that all sides agree could set a national model, a federal judge in Washington state in May sided with environmental groups in ruling that several large Yakima dairies' manure had polluted drinking water supplies with nitrate (http://www.yakimaherald.com/news/lower_valley/lower-valley-dairies-settle-final-issues-in-federal-case/article_c76923ed-c79f-5e48-843b-741aa8857701.html) and posed an imminent threat to human health. The dairies were ordered to provide clean drinking water to hundreds of neighbors with contaminated wells.



(<https://1tpe2p3bq4-flywheel.netdna-ssl.com/wp-content/uploads/2015/11/Copy-of-Wisconsin-dairy-farm.jpg>).

Kate Golden / Wisconsin Center for Investigative Journalism

Manure from dairy operations is blamed in part for nitrate that pollutes the drinking water in some parts of Wisconsin.

Giant dairy farms have mushroomed (<http://www.wisconsinwatch.org/2014/02/mega-dairys-growth-plans-hotly-debated/>) as Wisconsin's industry has consolidated. The Wisconsin Dairy Business Association, an industry group, has fought the notion that the large farms have tainted drinking water by citing the looser regulation of small farms and the presence of human, as well as animal, waste in wells.

The group acknowledges agriculture's role in the overall problem — and potential solutions.

“If anything, these dairies will be a big part of any improvements going forward,” said the association's representative John Holevoet, adding that such farms “have embraced regular soil testing and detailed nutrient management planning in a way that others have not,” and pointing to research and technologies to improve the efficiency of nitrogen use.

“The reality is, manure management has never been better or more sophisticated than it currently is. It will only get better,” Holevoet said.

However, even farmers who are following best farming practices set out by federal or state agencies may pollute the groundwater, particularly in areas with geologically vulnerable aquifers such as northeastern Wisconsin’s karst areas or the Central Sands region.

Kevin Masarik, a groundwater education specialist at UW-Stevens Point’s Center for Watershed Science and Education, said some of the factors are beyond farmers’ control.

“We don’t have a lot of tools in the toolbox to address nitrate in groundwater,” he said.

Blue babies and birth defects

Nitrate in drinking water poses a “serious health risk to infants and pregnant women,” said Roy Irving, a state Department of Health Services toxicologist. Those who are most at risk are babies who drink formula made with nitrate-contaminated well water; breastfed infants appear to be fine even if their mothers drink polluted water.

Wisconsin’s public health officer, Henry Anderson, said his department typically finds one or two cases of blue baby syndrome per year through scanning hospital discharge and emergency-room databases.

But the department does not follow up to find out if the cases were water-related, he said, as the illness can also be triggered by medications or a rare congenital disorder. Anderson and other experts said they believed outreach by pediatricians and public health officials has been effective.



(<https://type2391-flywheel.netdna-ssl.com/wp-content/uploads/2015/11/Capitol-protest.jpg>)

Abigail Becker / Wisconsin Center for Investigative Journalism

Dick Swanson of Algoma carries dolls painted blue to highlight “blue baby syndrome,” a condition caused when infants drink water polluted by nitrate. Swanson, a member of the advocacy group Kewaunee Cares, attended a “stink-in” with about 50 others on the steps of the Wisconsin State Capitol on Nov. 7 to protest pollution from concentrated animal feeding operations. Activists blame large-scale farming operations for contaminating drinking water in Kewaunee County and elsewhere.

“Every visit, we ask, ‘What kind of water do you use? Do you have a well?’ ” said Dr. Beth Neary, an environmental health advocate whose longtime Madison pediatric practice included many mothers from rural areas. “But there’s got to be people who don’t go to the doctor.”

Last year, the Department of Health Services updated its health advice to warn women who may become pregnant to stay away from water with high nitrate levels, based on emerging research linking the chemical to birth defects.

In one 2013 study of 3,300 Iowa and Texas case mothers and 1,121 control mothers, those whose babies had spina bifida, cleft palate or lip, or a limb deficiency were all more likely to have drunk (<http://ehp.niehs.nih.gov/wp-content/uploads/121/9/ehp.1206249.pdf>) at least 5.4 milligrams

of nitrate a day, which is under the health standard.

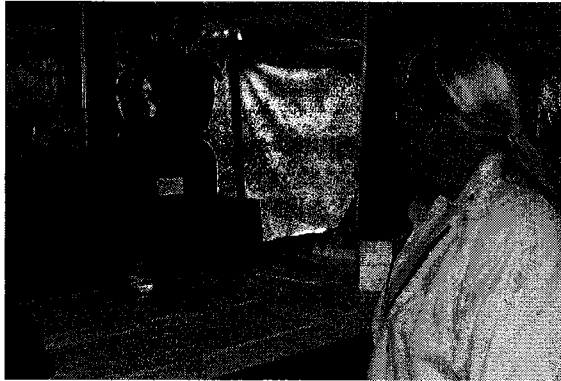
Some of those health effects, researchers have written, may be caused not by the nitrate itself but by contaminants, including pesticides, that often occur with it.

Dismaying statewide trend

In 2014, Masarik and a group of UW-Madison and state of Wisconsin collaborators analyzed (<http://ua.dnr.wi.gov/topic/Groundwater/documents/GCC/Minutes/posterMasarik201402.pdf>) a decade's worth of data for more than 8,500 churches, bars and other "transient non-community water systems" that are required to test at least annually for nitrate.

They projected that given the rising or falling nitrate levels among those wells, about 687 non-community systems, or 8 percent of the total, would eventually need to invest in a new well or a treatment system.

Because nitrate can take time to make its way down to aquifers, some recent trends may be the result of land use practices from decades ago. Improvements made now may take years to bear fruit.



(https://peppercorn.flywheel.netdna-ssl.com/wp-content/uploads/2015/11/Copy_of_Masarik-water-sample.jpg).

Ron Seely / Wisconsin Center for Investigative Journalism

Kevin Masarik, a groundwater education specialist at the University of Wisconsin-Stevens Point's Center for Watershed Science and Education, is seen here at Wisconsin Farm Technology Days near Sun Prairie in August. "I don't think we have fully realized what the extent of nitrate (in groundwater) is throughout Wisconsin yet," he said.

"I don't think we have fully realized what the extent of nitrate is throughout Wisconsin yet," Masarik said. "I think there's areas where we're going to continue to see wells exceeding the standard that maybe in the past have not been."

Masarik described how the Joneses saw their well water creep up over 20 milligrams per liter of nitrate — twice the safe limit. Doug Jones wondered if a 15-acre field he was renting out, on which corn and soy was growing, could be to blame. Would taking land out of production improve his well water?

"I don't know," Masarik told Jones, offering to monitor the water.

Two years later, the nitrate levels had decreased. But, Masarik acknowledged, it is not a strategy that most well owners have the "luxury" to employ.

People always ask him: What about septic systems?

In some areas they are to blame. Human waste is rich with nitrogen, just like animal waste. Septic systems that are improperly constructed or placed in areas with vulnerable geology can lead to polluted wells.

Statewide, septics account for about 9 percent of the nitrate inputs to groundwater. Lawn care contributes another 1 percent. Artificial fertilizer and manure contribute the remaining 90 percent.

Masarik estimates that to match the water quality impact of a 20-acre field of corn, those 20 acres would have to have 36 normally functioning septic systems on them.

“Nobody really wants to think that it’s because of them,” Masarik said, but added, “If you want to have an intelligent debate about where it’s coming from and how you can fix it, it’s important to really understand the source.”

Nutrient management no fix

Fertilizer usage has about quadrupled since 1960 nationwide, according to U.S. Department of Agriculture figures. The state Department of Agriculture, Trade and Consumer Protection estimates

(<http://dnr.wi.gov/topic/groundwater/documents/GCC/AgencyActivities/DATCPactivities.pdf>) that farmers applied over 200 million pounds of nitrogen in excess of UW-Extension crop recommendations in 2007.

Masarik said the nitrate problem is not mainly about farmers heedlessly polluting the landscape by over-applying nitrogen. The trouble is that no plant is perfect at soaking up nutrients.

The state agriculture department says nutrient management planning (http://datep.wi.gov/Farms/Nutrient_Management/) is one of the best ways to prevent excess nutrients from tainting the water. Wisconsin’s current standards are among the most stringent in the nation, agency spokeswoman Donna Gilson said, and revisions currently underway (<http://socwisconsin.org/current-work/nutrient-management/>) will require “substantially stronger restrictions” on spreading nutrients for certain soil types, in winter and near conduits to surface or groundwater.



(<https://11p27z3bq4-flywheel.netdna-ssl.com/wp-content/uploads/2015/11/Copy-of-central-sands-dirt.jpg>)

Kate Golden / Wisconsin Center for Investigative Journalism

The porous soil of Wisconsin’s Central Sands region allows manure and other fertilizers from farming operations to make their way into the aquifer, sometimes polluting the groundwater and drinking water with nitrate.

But state agriculture officials’ view of these plans’ effectiveness in addressing nitrate is rosier than that of groundwater experts Kraft and Masarik. Masarik, who was involved in research examining the effectiveness of such nutrient management planning, said the strategy may still result in contaminated wells unless farmers rotate their crops.

Even revisions to the nutrient management standards are unlikely to dramatically improve water quality, Masarik said. The benefits of such plans “may have been oversold in some cases — or misunderstood in terms of what’s actually realistic,” he said.

For one thing, such plans sometimes increase the use of nutrients. A [survey](http://www.jswconline.org/content/67/1/s1.full.pdf) (<http://www.jswconline.org/content/67/1/s1.full.pdf>) of 259 Wisconsin farmers, most of whom grow corn and soybeans with livestock, found that 51 percent increased their nitrogen applications after implementing nutrient management planning.

Well testing is rare

Private well owners in Wisconsin are not required (<http://dnr.wi.gov/topic/wells/retransfer.html>) to test their wells, and very few have done so, let alone on the annual schedule that public officials recommend. In some areas, even annual tests may not be often enough to guarantee safe water because pollution can spike one month and disappear the next.

Petitioners Sherryl and Doug Jones feel the state Department of Natural Resources has left residents to fend for themselves when it comes to ensuring the quality of their water.

What do the Joneses want?

"We all are entitled to clean water, drinking water," Doug Jones said. "There's no reason why with this day and age and all the science and technology that something can't be done to improve the situation because it just seems to be getting worse."

Others favor a change in state law, including mandatory testing of private wells.

"Leaving it up to the individual citizen is just not good public health policy," pediatrician Neary said.

Masarik, who spends much of his time encouraging people to test their wells, cautions that such a requirement could add a layer of bureaucracy without making the public any safer. What would well owners whose tests found nitrate be required to do?



(<https://112ezp3bq1-flywheel.netdna-ssl.com/wp-content/uploads/2015/11/jones-well.jpg>)

Bridgit Bowden / Wisconsin Center for Investigative Journalism

Doug and Sherryl Jones show a monitoring well on their property in rural Spring Green. The couple's drinking water was found in 2007 to contain twice the health limit for nitrate. They initially switched to bottled water but now have a reverse osmosis system to remove nitrate. The Joneses are among 16 petitioners seeking to force the state Department of Natural Resources to better enforce part of the Clean Water Act.

In some situations, "you kind of have to weigh your options," he said. "The government is not going to be able to make those decisions for them."

Masarik believes the government's most helpful role is educating health care providers, local health departments and rural well owners about their responsibility to test their water, especially when buying a piece of property or when a baby is on the way.

Short-term fixes costly

The cost of solving a nitrate problem for a household can run from hundreds of dollars a year for bottled water or water treatment systems to thousands of dollars to drill a new well. Treatment systems, in particular, require maintenance — and are no guarantees of safety, as another case from the Wisconsin Medical Journal illustrates.

Case 4 was a baby girl from Eau Claire County weighing 6 pounds and 10 ounces. She had been healthy for the first month of life. But she started to throw up after feedings and had loose stools. She was treated for dehydration and went home the next day.

Six days later she was readmitted and was described as “wasted and dusky,” or in other words, blue.

She had drunk formula made with well water. The family knew the water was contaminated and was filtering it with a reverse osmosis system.

A water sample taken while Case 4 was hospitalized showed nitrate at 9.9 milligrams, right near the health standard, with later samples at 12.5 and 23.5 milligrams per liter.

It turned out the family’s solution — a filter — was no solution at all.

Reporter Bridgit Bowden contributed to this report. Portions of the series were produced in collaboration with journalism classes participating in The Confluence, a project involving the Wisconsin Center for Investigative Journalism and the University of Wisconsin-Madison School of Journalism and Mass Communication. The nonprofit Wisconsin Center for Investigative Journalism (www.WisconsinWatch.org) collaborates with Wisconsin Public Radio, Wisconsin Public Television, other news media and the UW-Madison School of Journalism and Mass Communication. All works created, published, posted or disseminated by the Center do not necessarily reflect the views or opinions of UW-Madison or any of its affiliates.

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