



GROUNDWATER QUALITY WORKGROUP
Minutes of November 10, 2016 Meeting
[Supplementary FLW Staff Notes in Bracketed Italics]

Attendance

Present:

Workgroup Co-Chairs:

- Kevin Masarik, Groundwater Education Specialist, UW-Stevens Point
- Chuck Wagner, private well owner, Kewaunee County

Workgroup Members:

- Eric Allness, Management Analyst, USDA-NRCS
- Don Bennett, Farm Production Manager, Hartung Brothers Corporation (new member)
- Davina Bonness, County Conservationist, Kewaunee County Land and Water Conservation
- Mark Borchardt, Microbiologist, U.S. Dairy Forage Research Center
- Russ Brown, Waushara Co. farmer, WI Farmers Union
- Madeline Gotkowitz, Hydrogeologist Professor, Wisconsin Geological & Natural History Survey
- John Holevoet, Director of Government Affairs, Dairy Business Association (FLW Steering Committee member)
- Dale Konkol, County Conservationist, Door County Soil and Water Conservation
- Dave LaCrosse for John Pagel, Pagel's Ponderosa Dairy
- Maureen Muldoon, Hydrogeologist, UW Oshkosh
- Russ Rasmussen, WI Dept. of Natural Resources
- Sara Walling, WI Dept. of Agriculture, Trade and Consumer Protection

Facilitator: Ed Odgers, Retired State Conservation Engineer, WI Dept. of Agriculture, Trade and Consumer Protection

Recorder: Danielle Santry, Calumet County Land & Water Conservation Dept. *[FLW staff prepared minutes based on recorder's notes, Powerpoint presentations and audio recording. Supplementary staff notes are shown in bracketed italics.]*

Absent:

- Al Sweeney, Vice Chair, Rock County Land Conservation Committee
- Kevin Erb, Conservation Professional Development and Training Coordinator, UWEX
- Mark Garthwaite, Executive Director, Wisconsin Brewers Guild
- Don Niles, Co-Owner, Dairy Dreams, Kewaunee County

Minutes

The Workgroup approved the minutes of its October 23, 2016 meeting.

Expert Presentations

Kevin Masarik (Groundwater Education Specialist, UW-Stevens Point)

Workgroup Co-Chair Kevin Masarik gave a presentation on Nitrates in Wisconsin Groundwater. Some key points:

- Nitrate is the most widespread contaminant in Wisconsin groundwater. Contamination has increased over the years as have the number of private and municipal wells requiring treatment.
- There are many natural and human sources, but leaching from nitrogen-rich farm fields is the primary source.
- Nitrogen is an essential crop nutrient (requirements vary by crop). Farmers apply nitrogen fertilizer and manure to ensure that crops are well fed and produce abundant yields.
- Nitrogen cannot be applied with 100% efficiency. Even with the best application methods, only part of the applied nitrogen is actually taken up by the crop. A sizable portion of the “unused” nitrogen is eventually converted to nitrate and leached to groundwater.
- Groundwater nitrate concentrations exceed primary drinking water standards in many areas, especially in heavily row-cropped areas, sandy irrigated areas and karst areas. Nitrate in drinking water is a significant human health concern. Among other things, it causes “blue baby syndrome” – a potentially fatal condition that affects infants.
- In a 2012 survey, 47 Wisconsin communities reported that nitrate contamination in community wells had exceeded state enforcement standards (up from just 14 communities in 1999). Seventy-four other communities reported rising contamination. As of 2012, Wisconsin communities had spent over \$32 million for new community wells and treatments to address nitrate contamination.
- Nitrate contamination of private drinking wells is also widespread. *[In heavily farmed regions of central and southern Wisconsin, 20-30% of private wells exceed state enforcement standards for nitrate. One third of all Wisconsin residents get their drinking water from private wells.]*
- A new private well costs about \$7,200, and may not eliminate contamination. Bottled water costs about \$190 per person per year. Water treatment devices cost about \$800 (installation) plus \$100 per year (operation).

- Nitrate contamination rates are high in the Central Sands and Wisconsin River Valley (irrigated potatoes, corn and processed vegetables grown on sandy soil) and in heavily row-cropped areas of the state (corn and soybean rotations). Karst areas in the northeast and some other parts of the state also have significant nitrate contamination.
- Nitrogen application rates are higher for some crops such as corn and potatoes, two important Wisconsin crops. Higher nitrogen applications increase groundwater contamination risks, as do higher rainfall events. A significant amount of nitrogen can be carried over from one year to the next. Wet years following dry years are prone to large leaching losses.
- UW research showed that over a 7-year period 20% of the nitrogen applied to corn grown on a silt-loam soil, at recommended agronomic rates, leached to groundwater. Higher application rates, susceptible application sites, and heavy rainfall events increase leaching risks.
- Assuming that 20% of applied nitrogen will eventually leach to groundwater, it can be estimated that a 20-acre cornfield receiving optimal fertilizer would leach an estimated 640 lbs. of applied nitrogen per year. It would take 32 septic systems on the same 20-acre parcel to leach a comparable amount of nitrogen to groundwater.
- There are a number of agricultural practices that can help to reduce nitrogen loss from farm fields. These include application timing changes, use of nitrification inhibitors, cover crops, perennial crops, and extended crop rotations. Perennial crops generally have the largest impact, followed by extended rotations. Studies of cover crops in other states have shown potential for measurable reductions in nitrate leaching losses. However, it is not known whether Wisconsin would see the same level of success, due to greater challenges in establishing cover crops in our climate.
- In the last few years, it appears that nitrate contamination levels have been rising in some counties while stabilizing or falling in others. Improved management and technology may be helping to stabilize or even decrease nitrate concentrations in certain wells. Land use shifts can have a significant impact on contamination levels. In recent years, for example, there has been a shift to more intensive row cropping (corn and soybeans) in some areas.

Note: Kevin Masarik's Powerpoint presentation can be viewed at <http://wisconsinlandwater.org/programs/groundwater-quality>

Russ Rasmussen (WI Department of Natural Resources)

Workgroup member Russ Rasmussen, from the Department of Natural Resources (DNR), reported on an ongoing project to address critical groundwater concerns in Kewaunee County karst areas. DNR launched the project in 2015, and is implementing the project in cooperation with Kewaunee County. Some key points:

- DNR and Kewaunee County convened stakeholder workgroups to address karst area groundwater contamination problems. These included workgroups on *Short-Term Solutions*, *Compliance*, *Sensitive Areas/BMPs*, *Communications* and *Alternative Practices*. DNR also launched a well testing research project, which is ongoing.

- The *Short Term Solutions Workgroup* (14 members) reviewed issues faced by individuals who have wells contaminated by bacteria or nitrate. The Workgroup looked for ways to provide safe drinking water to affected individuals, and to provide them with clear information about safe drinking water options. The Workgroup developed 21 consensus recommendations, some of which have already been implemented. The top 5 short-term recommendations were:
 - DNR should investigate all E. coli positive samples in Kewaunee County that involved probable contamination from off-site livestock sources.
 - DNR should streamline eligibility for well compensation.
 - DNR should increase funding for follow-up E. coli testing.
 - DNR should provide emergency drinking water to affected well owners.
 - DNR or Kewaunee County should send precautionary notices to surrounding well owners.
- The *Compliance Workgroup* (21 members) reviewed compliance procedures for regulated livestock operations and farm practices affecting groundwater, and discussed ways to improve compliance. The Workgroup developed a number of recommendations, 14 of which received consensus or majority support. The top 5 recommendations were:
 - Conduct more audits of manure application and hauling practices in sensitive areas.
 - Add DNR compliance positions to monitor and enforce compliance with CAFO permits (focus is on better administration of existing requirements).
 - Do more stringent reviews of proposed CAFO land spreading variances.
 - Require all applicators to have spreading restriction maps and instructions on hand when spreading manure.
 - Improve well abandonment practices.
- The *Sensitive Areas/Best Management Practice Workgroup* (15 members) worked to identify locations that are susceptible to groundwater contamination, as well as best management practices (BMPs) to reduce contamination risks at those locations. Workgroup members identified a number of recommendations, 27 of which received consensus support. The top 5 consensus recommendations were:
 - No mechanical manure applications on land with a soil depth of less than 12 inches to bedrock.
 - No liquid manure applications on land with a soil depth of less than 24 inches to bedrock.
 - Inspect fields prior to manure application to determine depth to bedrock, fracture traces, groundwater conduits, and contributing channels or areas that drain to groundwater conduits. Update spreading maps based on inspections.
 - Spell out application practice recommendations based on depth to bedrock.
 - Maintain setbacks and other protective practices for locations with direct conduits to groundwater.

BMPs will initially be implemented on a voluntary basis (they will be evaluated, and possibly modified, over time). The focus is on pathogen reduction rather than nitrate leaching. BMPs are not meant to weaken, or detract from existing nonpoint pollution performance standards or technical standards. The Workgroup will conduct a further review after the 2016 crop harvest.

- The *Communication Workgroup* (7 members) will work on a final project report, and assist in providing communication tools. The Workgroup will also work to maintain ongoing, open lines of communication.
- The *Alternative Practices Workgroup* (16 members) is reviewing emerging technology, and will suggest practical manure management options that can lower contamination risks. This Workgroup has a medium- to long-term focus, as compared to the short-term focus of the *Sensitive Areas/Best Management Practice Workgroup*. The Workgroup is looking at potential innovations in areas such as soil health, karst science and manure treatment (including composting, digesters and advanced treatment).
- DNR and Kewaunee County are working to implement key recommendations. They are conducting nutrient management field audits, reallocating staff to strengthen monitoring and compliance, providing improved information and guidance, developing draft rule revisions (NR 151), and pursuing ongoing research.

Note: Russ Rasmussen's Powerpoint presentation can be viewed at <http://wisconsinlandwater.org/programs/groundwater-quality>

Sara Walling (Chief, Nutrient Management and Water Quality Section, WI Dept. of Agriculture, Trade and Consumer Protection)

Workgroup member Sara Walling gave a presentation on Wisconsin's Nutrient Management Program. Some key points:

- The WI Dept. of Agriculture, Trade and Consumer Protection (DATCP) has adopted land and water conservation standards for farms, including nutrient management standards. The standards implement nonpoint pollution standards adopted by the WI Dept. of Natural Resources (DNR).
- Among other things, a farm must have a *nutrient management plan* that is prepared by a qualified nutrient management planner (farmers can qualify). The plan must be based on soil tests, and must account for all crops and nutrient sources. Nutrient applications may not exceed UW recommendations, and must conform to federal standards (NRCS 590).
- Nutrient management compliance obligations are usually contingent on an offer [*not necessarily an acceptance*] of cost-sharing, at a rate of \$7 per acre. But the following entities must comply *regardless* of cost-sharing:
 - A livestock facility that is required to hold a DNR water quality permit. A DNR permit is required for facilities with 1,000 or more "animal units" (about 700 dairy cows).
 - A livestock facility with 500 or more "animal units" (about 350 dairy cows) *if* that facility is required to hold a local siting permit. [*About 25 counties and a substantial number of towns now require local siting permits for livestock facilities that will have 500 or more "animal units."*]
 - A livestock facility that accepts cost-sharing for manure storage.
 - A farm whose owner claims income tax credits under Wisconsin's farmland preservation program.
 - A farm that has received a notice of pollution discharge (NOD) from DNR.

- A farm whose owner has received nutrient management cost-share payments for at least 4 years (\$7 per acre for 4 years, or \$28 per acre).
- Counties are primarily responsible for implementing state farm conservation standards, including nutrient management standards. The state provides funding for county cost-share grants to farmers. Each county must have a plan that spells out conservation priorities, compliance strategies, and progress benchmarks. Plans vary between counties. *[For 2017, the State of Wisconsin (DATCP) has allocated about \$2.5 million to promote nutrient management, conservation tillage and other “soft” practices on farms. This includes about \$1.7 million in cost-share funding to counties – an average of \$24,000 per county (funding varies between counties). Another \$800,000 is earmarked for state-contracted training and field projects, including \$250,000 for “producer led” projects. Under a new federal-state “adaptive management” program, metropolitan sewage districts in some watersheds may also partner with counties to provide farm cost-share dollars. That could add another \$9 million in cost-share funding for nutrient management and related conservation practices in the affected watersheds. (The “adaptive management” program is primarily aimed at phosphorus runoff, but funded nutrient management practices may also reduce nitrate leaching.) USDA provides federal conservation cost-share funding to Wisconsin farmers; but federal conservation projects are completely voluntary, confidential, and independently administered by USDA – with only limited county involvement.]*
- Statewide, about 30% of Wisconsin crop acres are covered by nutrient management plans at this time. Coverage is higher in some counties: for example, in Brown and Kewaunee Counties, nutrient management plans cover 100% and 80% of crop acres, respectively. About half of the state’s covered crop acres *[i.e., 15% of all crop acres]* are covered by nutrient management plans prepared for large state- or locally-permitted livestock facilities. *[If manure from a permitted livestock facility is applied on other farms, those other farms must be covered under the livestock facility’s nutrient management plan.]*
- State nutrient management standards incorporate federal NRCS 590 standards. *[If NRCS 590 standards are not incorporated into state standards, they apply only to voluntary federal cost-share contracts.]* NRCS 590 was updated in 2015, to strengthen standards related to groundwater protection, winter spreading of manure, autumn application of nitrogen, and the amount of land needed for manure disposal. DATCP proposes to incorporate the NRCS 590 updates in its standards. The DATCP update will take about 2 years, and will require legislative committee approval.

Note: Sara Walling’s Powerpoint presentation can be viewed at <http://wisconsinlandwater.org/programs/groundwater-quality>

General Discussion and Comments

- ***Does nutrient management actually prevent groundwater contamination?***
 - Nutrient management is part of the solution, but not the whole solution.
 - Compliance with nutrient management standards does not, by itself, guarantee that groundwater standards will be met. But nutrient management compliance can help to prevent

some of the worst excesses. *[DATCP estimated that, in 2007, Wisconsin farmers applied about 200 million lbs. (100,000 tons) of nitrogen in excess of UW crop recommendations.]*

- Heavily row-cropped areas, karst areas, and areas with irrigated sandy soils pose special challenges. Nutrient management standards address some, but not all, of the nitrate leaching challenges in those areas.
- Wisconsin nutrient management standards incorporate crop nutrient application rates recommended by the University of Wisconsin. *[The UW recommendations are designed to optimize agronomic returns – yield relative to nutrient cost – not groundwater protection. But compliance with UW recommendations can help to curtail some of the worst excesses. Some farmers may exceed UW recommendations because they lack necessary information, such as soil test data. Others may apply excess nutrients as a “cheap insurance policy,” especially when crop prices are high relative to fertilizer prices. Still others may apply too much manure in order to dispose of excess manure, or to minimize manure hauling costs.]*
- Current groundwater contamination in karst regions is caused by current, not historical, agricultural practices. Liquid manure moves very rapidly through karst fissures. In some karst areas, groundwater contamination is occurring *despite* full nutrient management plan coverage. That suggests that current NM plans and standards are not adequate to protect groundwater, or that they are not being followed.

- ***Why don't we have full statewide compliance with existing nutrient management standards?***

- Despite current standards and cost-share incentives, only about 30% of Wisconsin farms have nutrient management plans. Compliance is improving, but only gradually.
- Many farmers are not fully informed about nutrient management.
- Nutrient management compliance is widely regarded as voluntary, and many farmers don't think it is worth the trouble or expense. Some farmers believe that nutrient management plans limit operational flexibility.
- Cost-share funding for nutrient management is limited. *[At current funding levels, it will take many years to achieve full statewide compliance. Cost-share funds, even when available, are not always used. Cost share offers go mainly to willing volunteers. Counties, in general, are reluctant to take compliance action against violators who decline to participate voluntarily.]*
- Even with cost-sharing, farmers must pay up to 30% of the cost for nutrient management plan development and soil testing. Cost-share payments also end after 4 years; after that, participating farmers must maintain full compliance at their expense. Compliance may reduce nutrient input costs for some farmers, but not others.
- Some livestock operators may face more fundamental barriers to compliance:
 - Compliance may require additional investments in manure storage, hauling and management, to avoid excessive manure applications.
 - Manure is costly to haul, so some operators may apply too much manure close to manure production sites – contrary to nutrient management standards.

- Manure production cannot be turned “on” or “off” in response to changing crop nutrient needs. Livestock operators must dispose of their manure, regardless of whether there is adequate local crop demand for that manure. That can lead to over-application.
 - Even where nutrient management plans are in place, it is not clear how well farmers are complying with them. Compliance is seldom audited. *[Farmers often cite the complexity of nutrient management plans as a reason for not following them. For livestock operators, compliance barriers also include manure hauling costs, the cost and availability of land for manure spreading, a lack of adequate manure storage capacity, and a shortage of manure hauling services during peak hauling periods.]*
 - The average Wisconsin farmer is 57 years old. “Sunsetting” farms are less likely to embrace change and adopt nutrient management.
 - Compliance can be difficult for small farms. On small farms, the fixed cost to develop and implement a nutrient management plan can be high relative to farm revenue.
 - Absentee ownership is a problem *[about 1/3 of all Wisconsin farmland is now held by absentee owners]*. Absentee landowners do not necessarily understand or monitor what is happening on their land, and their interests may differ from those of renter-operators. Landowners receive cost-share payments, but renter-operators have the burden of implementing nutrient management “on the ground.” Leases seldom address nutrient management responsibilities or cost reimbursement. A renter-operator who invests in nutrient management may lose that investment if the landowner subsequently leases the land to a new renter-operator.
- ***Are there tax credits or other compliance incentives for nutrient management?***
 - Farmers who claim income tax credits under the WI farmland preservation program must comply with nutrient management and other farm conservation standards, *regardless* of cost-sharing. This “conservation compliance” requirement is helping to increase nutrient management compliance.
 - *[However, only a fraction of all farmers claim the current farmland preservation income tax credit. There may be several reasons, including: (1) lack of knowledge; (2) the credit is only available in certified farmland preservation zoning districts and “agricultural enterprise areas;” (3) the amount of the credit (\$5-10 per acre) may be less than the farmer’s conservation compliance cost; and (4) other farm tax breaks, which come with no “conservation compliance” obligations, may be far more important to farmers.]*
 - ***Do we need to take additional steps in some cases?***
 - In some areas, compliance with current state nutrient management standards may not be enough to protect groundwater. We may need to consider additional steps, such as manure treatment or reduced production intensity in fragile areas. But these practices can be very costly, and they can pose existential challenges for some operations.

- *[Do we know what practices will work? Are they cost-effective?]*
 - *[Who should bear the cost?]*
 - *[When is it appropriate to provide public subsidies, tax incentives, cost-share grants, or other taxpayer-funded assistance to implement these additional practices?]*
 - *[What is the proper mix of pollution control “carrots” and “sticks?”]*
- ***What can we do better?***
 - We need more frequent and systematic groundwater monitoring, including statewide statistical sampling as well as locally targeted sampling in areas of special concern. We also need to encourage more testing by private well owners. DATCP has apparently scaled back its previous statewide monitoring program.
 - We need more systematic nutrient management compliance monitoring. A nutrient management plan serves no purpose if it is not followed.
 - We need to encourage more research, development and testing of new conservation practices and technologies. But research and testing should not be an excuse for delaying basic nutrient management compliance.
 - We need more education for farmers and the general public.
 - We need more funding for nutrient management, advanced conservation practices, groundwater monitoring, research and education; but this will be a challenge in today’s budget climate. Should we explore new funding sources (as Minnesota did for its “Legacy Fund”)?
 - Should we base financial incentives on success in achieving water quality goals? How?
 - ***What are our “bottom line” groundwater quality goals?***
 - Wisconsin residents value the state’s historically pure drinking water.
 - Wisconsin has already established health standards for drinking water.
 - We should aspire to prevent further degradation of drinking water, and restore compliance with existing drinking water standards where they are not currently being met. Wisconsin residents should have safe drinking water.
 - But how quickly can we achieve those goals? Will progress be harder in some areas than others? Are there fundamental impediments in some cases? Should we set timelines for compliance?
 - Realistic goals will vary by region – based on different land uses, soil types, geology and contamination threats. We should identify key problem areas, and develop goals, strategies and benchmarks that are specifically targeted to those areas.
 - It is difficult to measure and project overall groundwater quality trends. More systematic monitoring efforts would help.

Adjournment

By unanimous consent, the meeting was adjourned.