DUNN COUNTY

GROUNDWATER AD-HOC COMMITTEE REPORT

August 8, 2019

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ACKNOWLEDGEMENTS

This report was written by the Dunn County Groundwater Ad-hoc Committee. The members of this committee came together in January 2019, upon appointment by the Dunn County Board, to begin working on a collaborative effort to address issues surrounding groundwater. Members of the committee who helped create this report include:

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EXECUTIVE SUMMARY

The Dunn County Groundwater Ad-hoc Committee (the Committee) was formed in response to a heightened level of state and local interest and awareness surrounding drinking water and public health and safety. Many Wisconsin counties are currently conducting groundwater studies and are implementing programs focused on improving groundwater quality. Ongoing lawsuits in the state related to groundwater contamination and several published reports related to groundwater quantity and quality have contributed to the increase in awareness.

Protection of groundwater resources was identified as a concern in the 2017 report from the Dunn County Livestock Operations Study Group. The findings of the 2017 report were assigned to appropriate county committees for review and possible action recommendations. Both the Planning, Resource and Development Committee (PR&D), and the Health and Human Services Board (HHS) were assigned responsibility for reviewing groundwater concerns. Both committees determined that the most effective way to address their shared responsibility was through a collaborative effort. To facilitate this process, the committees requested that the county chair appoint a special study group that would bring together key departmental staff, committee members, resource persons and representative stakeholders from the community. The Dunn County Board Chairman approved the establishment of the Committee and it began meeting in January of 2019. The Committee was charged with developing a final report, with recommendations, to be presented to the Board for general information, and referred back to the PR&D and HHS committees for consideration of possible action.

Four major areas of focus were established during preliminary meetings (listed below). Policy gaps and public outreach needs were key findings identified by the Committee. A summary of recommendations, and suggested implementation plans can be found later in this report.

AREAS OF FOCUS *(recommendations by the Committee in italics)*

Prompt Action

A Policy Subcommittee was formed to research this topic. After policy review, and information gathered from subject matter experts, the subcommittee identified needs and gaps in relation to groundwater protection.

- *Adopt policies to preserve and protect Dunn County groundwater resources.*
- *Incorporate the protection of water resources into the Comprehensive Land Use Plan as well as other long-term Dunn County plans.*
- *Establish a Water Resources Council to provide ongoing coordination and support for water quality issues in Dunn County.*

Inform the public about data & facts on groundwater

A Public Information Subcommittee was formed to research this topic. After literature review and informational interviews, the subcommittee identified local and regional needs and gaps in relation to public understanding and accessibility to groundwater data and information.

- *Support & encourage land use best management practices (BMPs) throughout Dunn County.*
- *Launch an educational & informational campaign in collaboration with interested community stakeholders to increase awareness of the importance of water resources, causes and prevention of water pollution, and the collective impact of all land use on our water resources.*

Develop a shared and accessible database with groundwater data

The Committee identified a gap in public access to existing data and resources related to groundwater in Dunn County.

- *Provide citizens & staff of Dunn County with an easily accessible online resource for accessing information, resources, & data about water resources in Dunn County.*
- *Adopt and maintain the most current mapping technologies to provide easily accessible Dunn County land use information.*

Understand the status of groundwater in Dunn County

Dunn County Public Health Department (PHD) and Dunn County Land & Water Conservation Division (LWCD) gave presentations on existing groundwater data.

- *Increase the amount of monitoring of private wells and septic systems in Dunn County including the implementation of a well testing program.*

TERMS & DEFINITIONS

This section provides definitions for key vocabulary words and acronyms.

Best Management Practices (BMPs): Management techniques and practices that allow for the most economical and viable production while achieving the least possible adverse impact on the environment. BMPs minimize possible adverse impacts to human and animal health as well as the environment. Examples of BMPs in agriculture include the implementation of cover crops, nutrient management, no-tillage or reduced tillage systems, buffers to wells, and others.

Concentrated Animal Feeding Operation (CAFO): An animal feeding operation consisting of 1,000 animal units or more. An animal feeding operation may be designated as CAFO at a smaller-scale (i.e. fewer than 1,000 animal units) if it has pollutant discharges to navigable waters or contaminates a well.

Department of Agriculture, Trade, and Consumer Protection (DATCP): The governmental agency that is responsible for regulating agriculture, trade, and commercial activity in the State of Wisconsin.

Dunn County Groundwater Ad-hoc Committee (the Committee): The group of stakeholders that were appointed to identify public information and policy gaps, provide recommendations and publish this report.

Dunn County Corporation Counsel (Counsel): The Office of Corporation Counsel is an integral part of Dunn County's operational system, attending to all civil legal matters relating to Dunn County government and serving as legal counsel for Dunn County government, providing legal advice and services to the Dunn County Board of Supervisors, its committees, agencies, commissions and boards, elected officials, officers and employees with respect to the performance of their official duties.

Dunn County Environmental Services Department (ENS): The Dunn County Department that houses the Planning & Land Use Control, Solid Waste & Recycling, Surveying, and Land & Water Conservation Divisions.

Dunn County Land & Water Conservation Division (LWCD): The Land and Water Conservation Division is a part of the Environmental Services Department, which works with people in an honest, respectful, and accountable manner to manage the land and water resources of Dunn County.

Dunn County Public Health Department (PHD): The Dunn County Department that houses Environmental Health and Health Education Divisions.

Farm: Any place from which $1,000 or more of agricultural products are produced and sold, or normally would have been sold, during the year.

Human & Health Services Board (HHS): An eight-member County Board of Supervisors Committee responsible for developing policies and authorizing direction in the human services, public health, home care, and veterans service office in Dunn County.

Karst: A topography formed by the dissolution of soluble rocks such as limestone. It is characterized by closed depressions, sinkholes, fractured bedrock, and other unique features. Karst topography is present in Dunn County.

Natural Resources Conservation Service (NRCS): An agency of the United States Department of Agriculture (USDA) that provides technical assistance to farmers and private landowners.

Nutrient Management Plan (NMP): A plan used by farmers to account for all nitrogen, phosphorus and potassium (N, P, K) nutrients contained in fertilizer, manure, or other organic materials that are applied to fields over an entire crop rotation. A NMP follows the requirements of the NRCS 590 Standard.

Planning, Resource, & Development Committee (PR&D): A five-member County Board of Supervisors Committee responsible for policy and direction in land conservation, planning, surveying, and zoning in Dunn County.

Wisconsin Department of Natural Resources (DNR): The governmental agency that, in partnership with organizations and individuals, manages fish, wildlife, forests, parks, air, and water resources while promoting a healthy, sustainable environment and a full range of outdoor opportunities.

BACKGROUND

Groundwater Regulatory Oversight in Dunn County

Contaminants can enter surface and ground water from either point sources or nonpoint sources. Point sources release contaminants at a discrete site, such as a pipe or ditch. Point sources include but are not limited to wastewater treatment facilities, some industrial and commercial entities, and Concentrated Animal Feeding Operations (CAFO) production areas. Nonpoint sources contribute contaminants from a widespread, non-discrete area. Nonpoint sources include residential developments, agricultural areas, golf courses, and parking lots.

The agencies with the largest role in regulating point sources are the United States Environmental Protection Agency, Wisconsin Department of Natural Resources (DNR), and Wisconsin Department of Agriculture, Trade, and Consumer Protection (DATCP). There are nine permitted municipal point sources (waste water treatment facilities), five permitted CAFO production facilities, and no permitted industrial point sources in Dunn County at this time.

Nonpoint sources are more difficult to regulate due to the fact there is no single, identifiable discharge point. However, some nonpoint sources are regulated at the state and local level. Nonpoint sources present in Dunn County include high-density residential developments (well and septic), agricultural areas, golf courses and all other sources not designated as a point source. The state and local agencies with the largest role in regulating nonpoint sources are the DNR, Dunn County, and municipal governments (such as towns and cities) with local ordinances that relate to nonpoint sources.

Groundwater Quality in Dunn County

Surface and ground water quality is impacted by many different factors. Water moving over or beneath the ground can undergo chemical and physical changes due to natural factors and/or human activities. Natural factors that may contribute to groundwater contamination include some substances found naturally in rocks (i.e. manganese, arsenic, etc.), and other natural landscape characteristics such as depth to groundwater, depth to bedrock, soil type, and karst features. Human activities that may contribute to groundwater contamination include: septic and sewer management and maintenance; residential, agricultural, and commercial application of fertilizers, pesticides, and herbicides; municipal and industrial high capacity wells and others.

Major factors affecting groundwater quality in Dunn County include natural levels of arsenic and manganese, historic loss of wetlands and associated ecosystem functions, shallow depth to bedrock, nonpoint source contamination, and irrigation. While groundwater quality is important across the entire county, certain areas of Dunn County may be more susceptible to groundwater contamination and should be monitored closely. Portions of the county susceptible to groundwater contamination include areas of high groundwater recharge, areas with shallow depth to groundwater, areas with shallow depth to bedrock, and areas with direct conduits to groundwater including karst features, improperly abandoned wells, and improperly constructed and idle waste storage facilities.

The Committee reviewed and discussed existing published reports and water quality data. Nitrates, agricultural pesticides, coliform bacteria, arsenic, and manganese were identified by the Committee as contaminants of concern. Due to time limitations, regional reports published relating to high-capacity wells were only briefly discussed and reviewed. A summary of these findings can be found in Appendices B and C of this report.

Public Health Impacts

Approximately 60% of Dunn County residents get their drinking water from private wells. It is important to note that private wells are not required to be tested for safety or quality, like municipal systems. The water we drink directly impacts our health. While water is required for basic life functions, it can also be direct exposure to chemicals and bacteria that can make us sick.

Nitrate is a public health concern because of the potential harmful effects of exposure in contaminated drinking water. The illness methemoglobinemia occurs when infants ingest excessive nitrate, in formula or drinking water. Also known as "Blue Baby Syndrome", excess nitrate interferes with the oxygen-carrying capacity of the blood creating an oxygen deficiency which can be fatal. The federal drinking water standard of 10 mg/L of nitrate-nitrogen was established in 1977 because of this condition. All health effects of chronic nitrate exposure are not currently well understood, epidemiological studies have identified associations between consumption of water with high nitrate levels and other adverse human health outcomes including thyroid dysfunction, some cancers, diabetes and birth defects among children of mothers exposed during pregnancy. A summary of these findings can be found in Appendix C.

Lead and Arsenic are also public health drinking water contaminants of concern because of the significant impacts to health. Exposure to lead can result in behavior and learning problems; lower IQ and hyperactivity; anemia and slowed growth in children. Long-term exposure to high levels of inorganic arsenic have been associated with skin disorders and increased risks for diabetes, high blood pressure, and several types of cancer. Luckily, private well testing in Dunn County has not shown high levels of naturally occurring lead or arsenic.

Report Limitations

This report summarizes and reflects only the topics covered over the duration of the Ad-hoc Committee (January 2019 through July 2019). As such, it is not all encompassing, and largely addresses groundwater contaminants for which data was readily available and accessible at the time the report was created. Due to time constraints, the group did not have the ability to discuss topics such as emerging contaminants, weather patterns and local climate, contaminant leaks and spills, local hydrology and infrastructure as it relates to groundwater.

Due to the availability of private well water samples that contain nitrate concentrations spanning from 1982 to present, nitrate was a primary focus of the Committee. Nitrate is also often considered an indicator contaminant, meaning areas with groundwater with high nitrate concentrations (>10 mg/L – nitrate) may also be contaminated with other pollutants such as pesticides, herbicides, and others. For these reasons, the majority of recommendations address nitrate contamination.

In order to fully assess all issues surrounding groundwater in Dunn County, additional data, time, and funding is necessary.

Left: Photo depicts a private well head.

RECOMMENDATIONS

The Committee advises that Dunn County consider the following recommendations for action (not listed in order of priority or urgency). Each recommendation and work plan is expanded on in the next section of this report. Other ideas or proposals put forth that did not receive consensus or were brought forth but were not discussed, are located in Appendix A of this report.

RECOMMENDATION	WORK PLAN ELEMENT(S)
Adopt policies to preserve and protect Dunn County groundwater resources	Adopt a Stormwater Management Ordinance
	Adopt an Erosion Control Ordinance
	Revise existing ordinances (or consider new ordinances) to require buffers around wetlands
	Revise the Dunn County code of ordinances to grant citation authority to Dunn County the Environmental Services Department (ENS)
	Revise the Dunn County Subdivision Ordinance
Support and encourage land use BMPs throughout Dunn County	Establish a county initiative to support agricultural diversity as an economic development and water quality strategy
	Implement Nutrient Management Plans (NMPs) on 100% of cropland and pasture land in Dunn County
	Promote a farmer-led rotational grazing initiative
Adopt and maintain the most current mapping technologies to provide easily accessible Dunn County land use information	Aggregate existing spatial data relevant to groundwater protection into a mapping tool for use internally for project review and for use by the public to access important data and information
Incorporate the protection of water resources into the Comprehensive Land Use Plan as well as other long-term Dunn County plans	Update the Dunn County Comprehensive Land Use Plan to recognize groundwater as a valued resource and prioritize specific ways to preserve and protect the resource
Launch an educational and informational campaign in collaboration with interested community stakeholders to increase awareness of the importance of water resources, causes and prevention of water pollution, and the collective impact of all land use on our water resources	Develop a water quality campaign to engage and collaborate with stakeholders and community groups
	Develop an informational campaign for the agricultural community
	Present all proposed recommendations to Dunn County towns, villages, and cities
Increase the amount of monitoring of private wells and septic systems in Dunn County including the implementation of a well testing program	Establish voluntary monitoring of private wells and septic systems
	Launch a voluntary well testing program
Establish a Water Resources Council to provide ongoing coordination and support for water quality and quantity issues in Dunn County	Establish a Water Resources Council to provide ongoing collaboration on water quality and quantity issues with interested stakeholders
Provide citizens and staff of Dunn County with an easily accessible online resource for accessing information, resources, and data about water resources in Dunn County	Create a water quality web page that will provide citizens with resources, information, and a point-of-contact staff member

IMPLEMENTATION PLAN

The Committee advises that the County implement the following recommendations over the next ten years (by 2029). A suggested timeline for each recommendation with specific short-term, intermediate, and long-term action items is listed below with suggested delegation of responsibility, resources needed, and anticipated barriers. These implementation plans are not all inclusive and are meant to serve as guidance for accomplishing the recommendations. Note: these recommendations are not listed in order of priority or urgency.

Recommendation #1: Adopt policies to preserve and protect Dunn County groundwater resources	
Short term (0 - 12 months)	1. **Audit existing Dunn County ordinances and identify language that impacts (positively or negatively) groundwater resources within 6 months.** Appropriate standing Dunn County committees, in collaboration with their respective departments, should work to identify which ordinances may have potential to impact groundwater resources. Dunn County Corporation Counsel (Counsel) should be involved during this process. Dunn County should consider seeking the assistance of an external third party with the audit. Resources needed include staff time and dedicated time during committee meetings to discuss this topic. Barriers anticipated include staff time to complete the audit and lack of complete codified ordinances. 2. **Evaluate and audit necessary staff time and resources required to fully implement proposed Wetland Conservation Standards (or ordinance), septic monitoring and enforcement, ENS Citation Authority, Stormwater Management Ordinance, and Erosion Control Ordinance; provide a best estimate of total staff time needed to implement and enforce these policies within 1 year.** Use other Wisconsin counties that currently enforce similar ordinances as reference. PR&D, in collaboration with ENS managers, will complete this recommendation. Resources needed include staff time to: complete the evaluation/audit; create a standardized audit process and develop a summary report. Barriers anticipated may include difficulty of gaining access to other County's data and difficulty in quantifying staff time spent on one program/policy accurately. 3. **Revise the Dunn County Subdivision Ordinance to grant Dunn County the authority to require developers to follow specific suitability standards that are designed to preserve and protect environmentally sensitive areas, to ensure sound sustainable development, and to protect overall groundwater quality.** *The first draft should be completed within six months and the final draft approved by PR&D within eighteen months.* The Dunn County Surveyor and PR&D will enforce this ordinance. Counsel will complete this recommendation with assistance from ENS staff, especially the County Surveyor. Dunn County should consider utilizing external resources/organizations with expertise in wetland protection during this process, such as Wisconsin Wetlands Association. Resources needed include staff time and dedicated time during PR&D meetings. Barriers anticipated include lack of staff time to draft the ordinance.
Intermediate (1 - 5 years)	1. **Fill existing vacant Dunn County positions to implement and enforce water quality recommendations and/or ordinances listed in this report within 2 years.** The County will ultimately complete this recommendation, as prompted by committees that oversee departments that implement and enforce these ordinances. Resources needed include sufficient budget to accommodate a skilled and experienced full-time staff person with benefits and additional logistical resources needed for staff members. Barriers include sufficient budget and staffing resources.

(Implementation Plan for Recommendation #1 continued on next page)

Recommendation #1 (*continued*): Adopt policies to preserve and protect Dunn County groundwater resources	
Intermediate (1- 5 years)	2. **Revise the Dunn County code of ordinances to grant citation authority to ENS.** *The first draft should be completed within one year, and the final draft approved by PR&D within two years.* Counsel will complete this recommendation with assistance from ENS staff. Resources needed include staff time and dedicated time during PR&D meetings. Barriers anticipated include lack of staff time to draft the ordinance, and also to implement/enforce ordinance. 3. **Adopt wetland conservation standards and incorporate them into existing ordinances for the purpose of protecting county groundwater quality within 2 years.** Dunn County committees, in collaboration with their respective departments, should work to identify which ordinances may need to be updated or modified to include wetland conservation standards. Counsel should be involved throughout this process. Dunn County should consider utilizing external resources/organizations with expertise in wetland protection during this process, such as the Wisconsin Wetlands Association. Resources needed include guidance documents such as the "Model Wetland Conservation Ordinance: A Policy Development Tool for Wisconsin Counties, Cities, Towns, and Tribes". Barriers anticipated include staff time required to: collaborate with external agencies/organizations; draft ordinance updates; and implement and enforce proposed wetland conservation standards. 4. **Adopt a Dunn County Stormwater Management Ordinance for the purpose of reducing the impact of construction related ground disturbance on groundwater within 3 to 5 years.** Dunn County Planning & Zoning and LWCD will complete this recommendation with assistance from Counsel. Resources needed include guidance documents such as the "Model Ordinances for Construction Site Erosion and Sediment Control and Post-Construction Storm Water Management" (WDNR, 2015), staff time required to collaborate with external agencies and to write the proposed ordinance. Dunn County should consider utilizing local resources such as Eau Claire County Land & Water Conservation, Wisconsin Land + Water, and others for guidance and assistance with drafting this ordinance. Barriers anticipated include lack of staff time to draft ordinance and also to implement/enforce ordinance. 5. **Adopt an Erosion Control Ordinance for the purpose of gaining oversight on construction related ground disturbance to protect groundwater within 5 years.** Dunn County Planning & Zoning and LWCD will complete this recommendation with assistance from Counsel. Resources needed include guidance documents such as the "Model Ordinances for Construction Site Erosion and Sediment Control and Post-Construction Storm Water Management" (WDNR, 2015), staff time required to collaborate with external agencies and to write the proposed ordinance. Dunn County should consider utilizing local resources such as Eau Claire County Land & Water Conservation, Wisconsin Land + Water, and others for guidance and assistance with drafting this ordinance. Barriers anticipated include lack of staff time to draft ordinance and also to implement/enforce ordinance.
Long term (5 - 10 years)	1. **Evaluate success of proposed policy changes over the next 10 years.** PR&D and the HHS Committees will complete this recommendation. 2. **Hire additional staff members to implement and enforce water quality recommendations and/or ordinances listed in this report within 5 to 10 years, or sooner, depending on workload.** The County will ultimately complete this recommendation as prompted by Committees that oversee Departments that implement and enforce these ordinances. Resources needed include sufficient budget to accommodate a skilled and experienced full-time staff person with benefits and additional logistical resources needed for staff members.

Recommendation #2: Support & encourage land use best management practices (BMPs) throughout Dunn County	
Short term (0 - 12 months)	1. **Create a farmer-led rotational grazing initiative within 12 months.** LWCD and the Natural Resources Conservation Service (NRCS) should work to identify areas which might benefit the most from rotational grazing practices. Bring in outside resources to engage farmers in those areas and educate on the benefits of rotational grazing. Barriers include staff time and ability to provide potentially required match funding for grants. 2. **Educate and inform all producers that a NMP per State Statute (NR 151.07) is required for all fields receiving nutrients or manure within 12 months.** LWCD will complete this recommendation with assistance from partners such as NRCS and DNR. Resources needed include staff time to complete farm visits, program administration, provide education and assistance to producers, and to answer questions and concerns. Barriers anticipated include lack of staff time to accomplish this goal, lack of adequate partner relationships to accomplish this goal, and lack of funding to provide education and outreach needed to accomplish this goal. 3. **Implement a certification program for agricultural producers that recognizes the adoption of conservation practices that protect water quality, establish standards and certification process, and support market and economic development opportunities within 12 months.** Dunn County should consider seeking assistance of an external third party with the education and marketing campaign (Dunn County Economic Development Corporation). Resources needed include a budget to hire third party. Barriers anticipated include lack of education of consumers and producers. 4. **Fill the vacant Conservation Planner Position within the Land & Water Conservation Division within 1 year.** The County will ultimately complete this recommendation as prompted by PR&D. Resources needed include sufficient budget to accommodate a skilled and experienced full-time staff person with benefits and additional logistical resources. Barriers include sufficient budget and staffing resources.
Intermediate (1 - 5 years)	1. **Establish water quality certification program within 3 years.** Dunn County and partners will need to establish a certification process and a monitoring/enforcement plan to enable the program to succeed. In addition, a tax proposal will need to be written and passed to give incentives to producers who meet the water quality certification. Barriers anticipated include staff time required to collaborate with external agencies/organizations, passing the required tax increase for incentive, and establishing the certifying organization structure. 2. **Expand farmer-led rotational grazing initiatives within 5 years.** LWCD and NRCS will complete this recommendation with assistance from interested community partners. Provide continued support including potential ongoing programs or initiatives that support farmers in their practices. Partner with other organizations or regulatory bodies for more resources/support. Resources needed include additional funding for staff time, outreach events, and potential match required for grants. Barriers anticipated include lack of sufficient staff time and funding. 3. **Increase the number of cropland acres within Dunn County that are covered by a nutrient management plan each year by 10%.** LWCD will complete this recommendation with assistance from partners such as NRCS and DNR. Resources needed include staff time to complete farm visits, program administration, provide education and assistance to producers, and to answer questions and concerns. Barriers anticipated include lack of staff time to accomplish this goal, lack of adequate partner relationships to accomplish this goal, and lack of funding to provide education and outreach needed to accomplish this goal. 4. **Request additional annual grant funding from DATCP/DNR for Nutrient Management within 2 to 5 years.** The County will ultimately complete this recommendation as prompted by PR&D. Resources needed include staff time to identify necessary amount of funding and dedicated time during committee meetings. Barriers anticipated include staff time and availability of funding.
Long term (5 - 10 years)	1. **Evaluate success land use BMP adoption over the course of the next 10 years.** PR&D and HHS Committees will complete this recommendation. Dunn County should consider seeking assistance from external partners, such as UW-Stout, to complete these evaluations.

(Implementation Plan for Recommendation #2 continued on next page)

Recommendation #2 (*continued*): Support & encourage land use best management practices (BMPs) throughout Dunn County	
Long term (5 - 10 years)	2. **Advance the Water Quality Program to other counties and states to improve the markets to local producers over the next 10 years.** Utilize the third party's education campaign to motivate other counties/states to take on this type of program. Utilize other agencies to assist Dunn County initiative to broaden water quality improvement. Resources needed include sufficient budget to hire a third party organization to assist in lobbying of agencies. 3. **Implement a nutrient management plan on 100% of the cropland fields in Dunn County that receive nutrients and manure within 10 years.** LWCD will complete this recommendation with assistance from partners such as NRCS and DNR. Resources needed include staff time to complete farm visits, program administration, provide education and assistance to producers, and to answer questions and concerns. Barriers anticipated include lack of staff time to accomplish this goal, lack of adequate partner relationships to accomplish this goal, and lack of funding to provide education and outreach needed to accomplish this goal.

Recommendation #3: Adopt & maintain the most current mapping technologies to provide easily accessible Dunn County land use information	
Short term (0 - 12 months)	1. **Identify what data is useful to internal staff within 6 months.** Dunn County Land Information will complete this recommendation with input from other county departments. Suggested data includes wetland indicators, high groundwater recharge areas, permeability, floodplains, shoreland zoning, depth to groundwater, and others. Resources needed include staff time. Barriers anticipated include staff time. 2. **Aggregate identified data into a single mapping tool within 12 months.** Dunn County Land Information will complete this recommendation with assistance from other departments as needed. Resources needed include staff time and possibly funding to acquire certain data. Barriers anticipated include staff time and funding (if necessary).
Intermediate (1 - 5 years)	1. **Utilize and enhance internal spatial mapping tool over the next 5 years.** All relevant Dunn County departments and committees will complete this recommendation with possible assistance from external partners. Suggested uses of the mapping tool include review of proposed projects and plans, prioritization of susceptible areas in Dunn County for additional studies or assistance and for creation of informed policies and ordinances. Resources needed include staff time. Barriers anticipated include staff time. 2. **Create a publicly accessible spatial mapping tool within 2 years.** Dunn County Land Information will complete this recommendation with assistance from other departments as needed. Resources needed include staff time and possibly funding to acquire certain data. Barriers anticipated include staff time and funding (if necessary).
Long term (5 - 10 years)	1. **Evaluate success of the mapping updates over the next 10 years.** PR&D and HHS Committees will complete this recommendation.

Recommendation #4: Incorporate the protection of water resources into the Comprehensive Land Use Plan as well as other long-term Dunn County plans	
Short term (0 - 12 months)	1. **Adopt a joint HHS and PR&D resolution supporting the protection of groundwater in Dunn county within 6 months.** PR&D and HHS Committees will complete this recommendation.

(Implementation Plan for Recommendation #4 continued on next page)

Recommendation #4 (continued): Incorporate the protection of water resources into the Comprehensive Land Use Plan as well as other long-term Dunn County plans	
Intermediate (1 - 5 years)	1. **Incorporate the protection of water resources into the Comprehensive Land Use Plan within 1 year.** Dunn County Planning & Zoning Division will complete this recommendation with support from other necessary committees and departments. Resources needed include staff time and dedicated time during committee meetings to address the topic. 2. **Incorporate the protection of water resources into other long-term Dunn County plans, such as the Land & Water Resource Management Plan, as revisions are made over the next 5 years.** Various Dunn County committees and departments will complete this goal as opportunities become available. Resources needed include staff time and dedicated time during committee meetings to address the topic.
Long term (5 - 10 years)	*N/A*

Recommendation #5: Launch an educational and informational campaign in collaboration with interested community stakeholders to increase awareness of the importance of water resources, causes and prevention of water pollution, and the collective impact of all land use on our water resources	
Short term (0 - 12 months)	1. **Publish a press release and hold a public meeting summarizing the final report within 3 months of the completion of this report.** PR&D will complete this recommendation. Resources needed include the final report and committee member time. 2. **Develop an informational campaign with the agricultural community that emphasizes conservation BMPs (NMP compliance, soil health principles, and irrigation management) within 1 year.** LWCD will complete this recommendation with external collaboration from governmental agencies and ag-related organizations. Resources needed include staff time to plan, create media content, and collaborate. Barriers anticipated include staff time and funding to create media. 3. **Develop a water quality educational campaign tailored to the general public including youth, businesses, landowners and private well owners to emphasize the importance of water protection practices such as well testing, septic maintenance, and proper use and disposal of household & landscape chemicals within 1 year.** ENS and PHD will complete this recommendation with input from UW-Extension, community groups and interested citizens. Resources needed include staff time for the purpose of planning, media creation, and collaboration. Barriers anticipated include staff time/availability and funding to generate and create media. 4. **Present Ad-hoc Committee recommendations to all of the Dunn County town boards at the Wisconsin Towns Association: Dunn County Unit Meeting within 1 year of the completion of this report.** Representative from LWCD and PHD will complete this recommendation. Resources needed include the final report, presentation resources, and staff time.
Intermediate (1 - 5 years)	1. **Launch the informational campaign tailored for the agricultural community upon completion of development over 24 months.** LWCD will complete this recommendation with external collaboration from governmental agencies and ag-related organizations. Resources needed include presentation resources, outreach and survey materials, and staff time for the purpose of collaboration, community meeting attendance/presentations, and relationship building. Barriers anticipated include staff time, partner availability, and sufficient budget.

(Implementation Plan for Recommendation #5 continued on next page)

Recommendation #5 (continued): Launch an educational and informational campaign in collaboration with interested community stakeholders to increase awareness of the importance of water resources, causes and prevention of water pollution, and the collective impact of all land use on our water resources	
Intermediate (1 - 5 years)	2. **Launch the educational campaign tailored for the general public including youth, businesses, landowners and private well owners upon completion of campaign planning within 2 years.** ENS and PHD will complete this recommendation with collaboration from UW-Extension, the proposed Water Resources Council and other external organizations. Resources needed include presentation resources, outreach and survey materials, and personnel time for the purpose of collaboration, community meeting attendance/presentations, and relationship building. Barriers anticipated include staff time, partner availability, and sufficient budget. 3. **Provide tailored resources and information to Dunn County city, village and town boards based on local water quality data/information at individual meetings within 2 years following the initial presentation to the Wisconsin Towns Association: Dunn County unit meeting.** Representative from LWCD & PHD will complete this recommendation with assistance from the proposed Water Resources Council and other external organizations. Resources needed include the final report executive summary, 1-page data handout, presentation resources, and personnel time. Barriers anticipated include coordinating schedules for 8+ evening meetings and time to localize report to geographic area.
Long term (5 - 10 years)	1. **Evaluate success of informational campaigns and collaboration efforts within 5 years of launch of campaigns.** PR&D and HHS Committees will complete this recommendation.

Recommendation #6: Increase the amount of monitoring of private wells and septic systems in Dunn County including the implementation of a well testing program	
Short term (0 - 12 months)	1. **Develop a model for a county-wide well testing program including potential future funding sources within 1 year.** LWCD and PHD will complete this recommendation with collaboration from the proposed Water Resources Council and Counsel. Resources needed include staff time, outreach materials, and data management protocol. Barriers include staff time and resources. 2. **Identify priority areas of concern within Dunn County in relation to existing groundwater contamination and/or groundwater contamination susceptibility and identified data gaps within 3 months.** LWCD, PHD and Land Information will complete this recommendation with assistance from subject matter experts. Resources needed include water quality data, ArcGIS spatial analysis software, existing local reports and figures that relate to groundwater contamination and groundwater contamination susceptibility. Barriers anticipated include staff time. 3. **Develop informational materials including a summary of well water testing resources and funding opportunities for targeted outreach to landowners within Dunn County that reside in previously identified high priority areas within 12 months.** LWCD and PHD will complete this recommendation with input from subject matter experts. Resources needed include staff time, relevant software and outreach materials. Barriers anticipated include staff time. 4. **Develop informational materials including a summary of well water testing resources and sampling information for non-targeted outreach to landowners within Dunn County within 12 months.** LWCD and PHD will complete this recommendation with input from subject matter experts. Resources needed include staff time, relevant software and outreach materials. Barriers anticipated include staff time.

(Implementation Plan for Recommendation #6 continued on next page)

Recommendation #6 (continued): Increase the amount of monitoring of private wells and septic systems in Dunn County including the implementation of a well testing program	
Short term (0 - 12 months)	5. **Develop an informational campaign about proper septic system installation, maintenance, and septage spreading within 12 months.** PHD and Dunn County Planning & Zoning will complete this recommendation with assistance from subject matter experts. Resources needed include staff time. Barriers anticipated include staff time and funding.
Intermediate (1 - 5 years)	1. **Implement the county wide well testing program over one to three years, depending on available resources.** LWCD and PHD will complete this recommendation with assistance from the proposed Water Resources Council. Resources needed include staff time, potential funding, and program materials. Barriers anticipated include staff time and funding. 2. **Collect private well water sampling data and continue to improve the existing Dunn County dataset over the next 5 years.** LWCD, PHD, and Land Information will complete this recommendation with assistance from the proposed Water Resources Council. Resources needed include staff time, potential funding, and program materials. Barriers anticipated include staff time and funding. 3. **Increase the amount of compliance checks for septic system siting and maintenance in Dunn County over the next 5 years.** Dunn County Planning & Land Use Control Division will complete this recommendation with assistance from the proposed Water Resources Council. Resources needed include staff time, potential funding, and program materials. Barriers anticipated include staff time and funding. 4. **Launch the informational campaign tailored to septic system owners and other interested stakeholders in Dunn County over the next 5 years.** Dunn County Planning & Land Use Control Division and PHD will complete this recommendation with assistance from the proposed Water Resources Council. Resources needed include staff time, potential funding, and program materials. Barriers anticipated include staff time and sufficient funding.
Long term (5 - 10 years)	1. **Evaluate success of informational campaigns, well testing program and collaboration efforts within 5 years of launch of campaigns.** PR&D and HHS Committees will complete this recommendation. Dunn County should consider seeking assistance from external partners, such as UW-Stout to complete these evaluations.

Recommendation #7: Establish a Water Resources Council to provide ongoing coordination & support for water quality issues in Dunn County	
Short term (0 - 12 months)	1. **Research and develop a model for establishing an ongoing Water Resources Council that is affiliated with Dunn County and also leverages broad community engagement, resources, and time within 12 months.** The County will ultimately complete this recommendation based on a joint resolution brought forth by the PR&D and HHS Committees. Dunn County should consider input and assistance from local resources such as the Eau Claire Groundwater Advisory Committee and Pepin County Water Advisory Group. Resources needed include support of existing community organizations, time to research successful examples in other communities, and dedicated time during committee meetings.

(Implementation Plan for Recommendation #7 continued on next page)

Recommendation #7 (continued): Establish a Water Resources Council to provide ongoing coordination & support for water quality issues in Dunn County	
Intermediate (1 - 5 years)	1. **Establish a Water Resources Council with a recommended composition of County Board members, water resource professionals, farmers, and engaged landowners/organizations within 12 months.** The County will complete this recommendation with input from the PR&D and HHS Committees. 2. **Allow Water Resources Council to act in an advisory role to Dunn County Board and its Committees, and also to provide support to departments as recommendations from this report are implemented, as needed, over the next 5 years.** The proposed Water Resources Council will complete this recommendation as directed by the County and the Water Resources Council members. 3. **Reauthorize the Water Resources Council every 5 years.** The County will complete this recommendation.
Long term (5 - 10 years)	1. **Evaluate success of Water Resources Council over the next 10 years.** PR&D and HHS Committees will complete this recommendation.

Recommendation #8: Provide citizens and staff of Dunn County with an easily accessible online resources for accessing information, resources, and data about water resources in Dunn County	
Short term (0 - 12 months)	1. **Approve the "Dunn County Private Well Water Quality Viewer" web application within 3 months.** Dunn County Land Information will complete this recommendation with input from PR&D and related ENS divisions. Resources needed include staff time to finalize the web application and to support the tool once it is launched. Barriers include staff time needed to continuously update data. 2. **Create a "Water Quality" web page on the existing Dunn County website with resources and information including a point-of-contact staff member, the "Dunn County Private Well Water Quality Viewer", best management practices for protecting and conserving surface and groundwater, and resources for well owners with high levels of contamination within 1 year.** LWCD, PHD, and Land Information will complete this recommendation. Resources needed include staff time for the purpose of content generation and collaboration. Barriers anticipated include staff time to continuously update web page.
Intermediate (1 - 5 years)	1. **Create a stand-alone website for Water Quality in Dunn County with resources and information, in addition to blog posts, photos and videos, and local success stories related to water quality in Dunn County within 5 years.** LWCD, PHD, Land Information, and the proposed Water Resources Council will complete this recommendation. Resources needed include staff time for the purpose of content generation, and collaboration and sufficient budget to create and maintain the website. Barriers anticipated include sufficient budget and staff time needed to create content (blogs, photos, videos) on a regular basis to ensure page is useful and relevant.
Long term (5 - 10 years)	1. **Evaluate success of this recommendation over the next 10 years.** PR&D and HHS Committees will complete this recommendation.

APPENDICIES

Appendix A: Recommendations That Did Not Receive General Consensus or Were Brought Forth and Not Fully Discussed

Appendix B: Data/Maps/Figures

Appendix C: References/ Literature Review

Appendix A:

Recommendations That Did Not Receive General Consensus or Were Brought Forth and Not Fully Discussed

Recommendations That Did Not Receive General Consensus or Were Brought Forth and Not Fully Discussed *

- A scientifically derived sampling of private well owners located within environmental vulnerable areas of Dunn County should be offered cost sharing for well testing on an every 3 year basis.
- Collect all new well construction data directly from DNR forms.
- Create a water quality contingency fund that could be used to fund well abandonment, manure pit abandonment, etc.
- Develop a Groundwater Protection Ordinance.
- Develop an enforcement process with collaboration and participation from County staff, Wisconsin Department of Natural Resources' staff, townships, etc.
- Develop guidance for manure spreading that addresses volume, frequency, and rate of applications.
- Establish clear guidance at the local level for response to a contamination event or spill event.
- Every citizen in Wisconsin with above acceptable levels of nitrates, lead, arsenic, or chemicals should be made aware of the state program for cost sharing for well replacement.
- Every citizen should be made aware of the county website with information about Dunn County water quality and quantity testing results.
- Every citizen should be made aware of the value in well water testing, location of testing labs, and offered to include their results anonymously in Dunn County statistics.
- Every citizen within Dunn County should have an opportunity to volunteer for private well testing every 3 years and submit results to Dunn County groundwater database.
- Every citizen within Dunn County with a private well should have access to a non- proprietary water specialist to answer their questions, direct their research about their well water concerns, or their options for improving their well water quality and quantity.
- Every farmer within Dunn County should be made aware of the funding available for not planting row crops on excellent or very good recharge areas.
- Every rural citizen should be made aware of cost sharing for appropriately closing abandoned wells and the importance of appropriate abandonment to the water table.
- Help build local markets for winter wheat, cereal rye, and other potential "third crops".
- Help establish new markets to allow producers in Dunn County to diversify crop rotations.
- Identify and close all abandoned wells in Dunn County.
- Identify direct conduits to groundwater such as karst features and rock outcrops through use of LiDAR data. Consider permanently marking these features.
- Increase enforcement of improperly abandoned manure pits.
- Increase enforcement of improperly abandoned wells.
- Increase enforcement of improperly sited septic systems.
- Increase septic monitoring fees to reflect current and future costs of enforcement and siting.
- Increase the visibility of conservation practices through the use of signs in Dunn County.

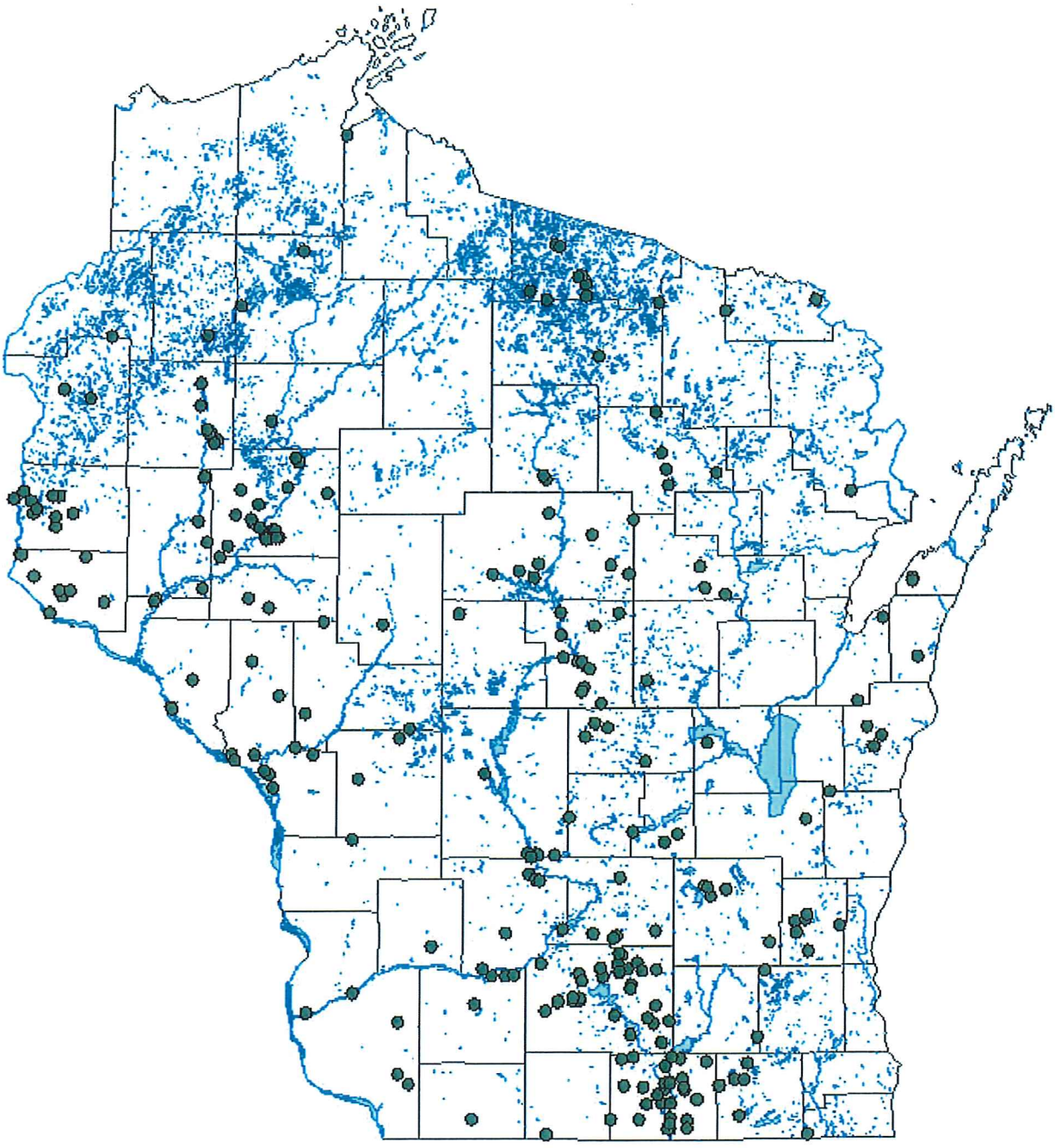
- Install monitoring wells throughout Dunn County and dedicate funds to sample water on a recurring basis.
- Make use of ad-hoc committees when the need arises.
- Nutrient Management Plans should be placed on public internet site allowing the public to access when and where farmers are allowed to appropriately spread manure thereby allowing citizens to learn about and monitor appropriate manure spreading.
- Permitted industrial and human septage spreading sites should be publically available to all citizens thereby allowing all citizens to learn about and help monitor legal spreading.
- Present to non-governmental organizations and ask to be included in their newsletters.
- Promote crop insurance incentives to increase adoption of cover crops (similar to the programs in Iowa and Illinois')
- Pursue grants for the purpose of finding funds to fund well water sampling/monitoring program.
- Recommend future emerging contaminants be promptly reviewed and considered by Dunn County Committees and/or County Board.
- Recommend increasing minimum setbacks from shoreland to achieve greater nitrogen and bacteria reduction.
- Require that well testing results be shared with County when a change of ownership or well work occurs.
- Resources to provide ongoing research and program updates about well water quality protecting health, safety and welfare of citizens should be identified and available to the public on the internet by December 2019.
- Revise definition of environmentally sensitive areas to include areas of high groundwater recharge.
- Revise Shoreland Protection Ordinance to redefine 'areas to be regulated' to include existing, mapped, or delineated wetlands.
- Specific actions (objectives) to improve and maintain the quality of Dunn County private well water will be identified and prioritized and shared with all County citizens.
- Update inventory of all septic systems.
- Write request to the United States Department of Agriculture and/or Wisconsin State Legislature to establish a certification that allows producers who follow agricultural best management practices to become certified as sustainable.

*Some of these recommendations were incorporated into broader recommendations or implementation plans that are included in the main report, but potentially did not include the same phrasing or exact wording.

Appendix B:

Data/Maps/Figures

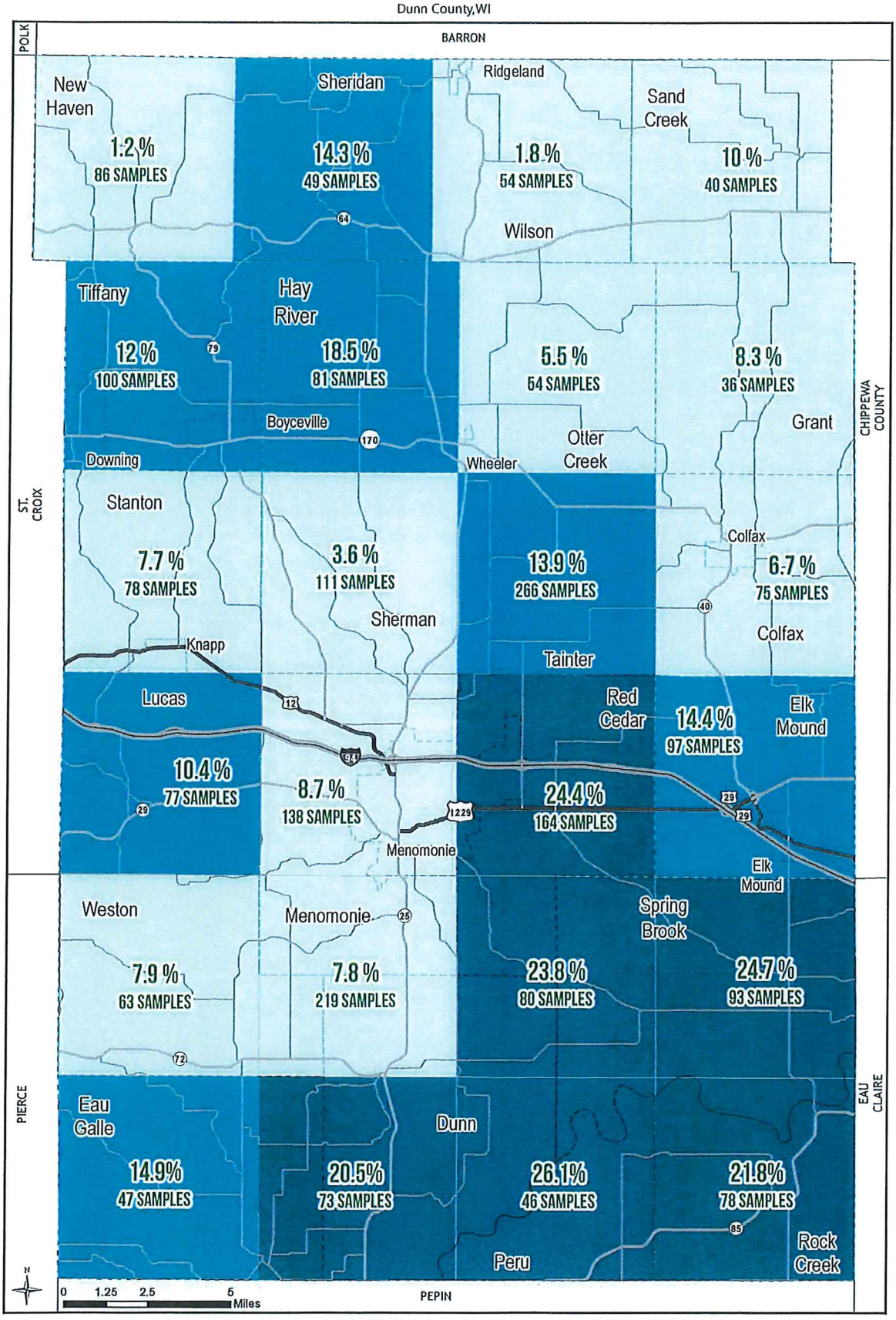
Transient Non Community wells currently exceeding the 10mg/l for nitrate. These systems will be evaluated for opportunities to assist them in returning into compliance.



Look up more information on these systems: https://dnr.wi.gov/topic/drinkingwater/qualitydata.html

Percent of Private Well Samples Not Meeting WI Nitrate Standards (1987-2016)

Dunn County,WI



Percent of Wells with > 10ppm Nitrate Results | Municipality

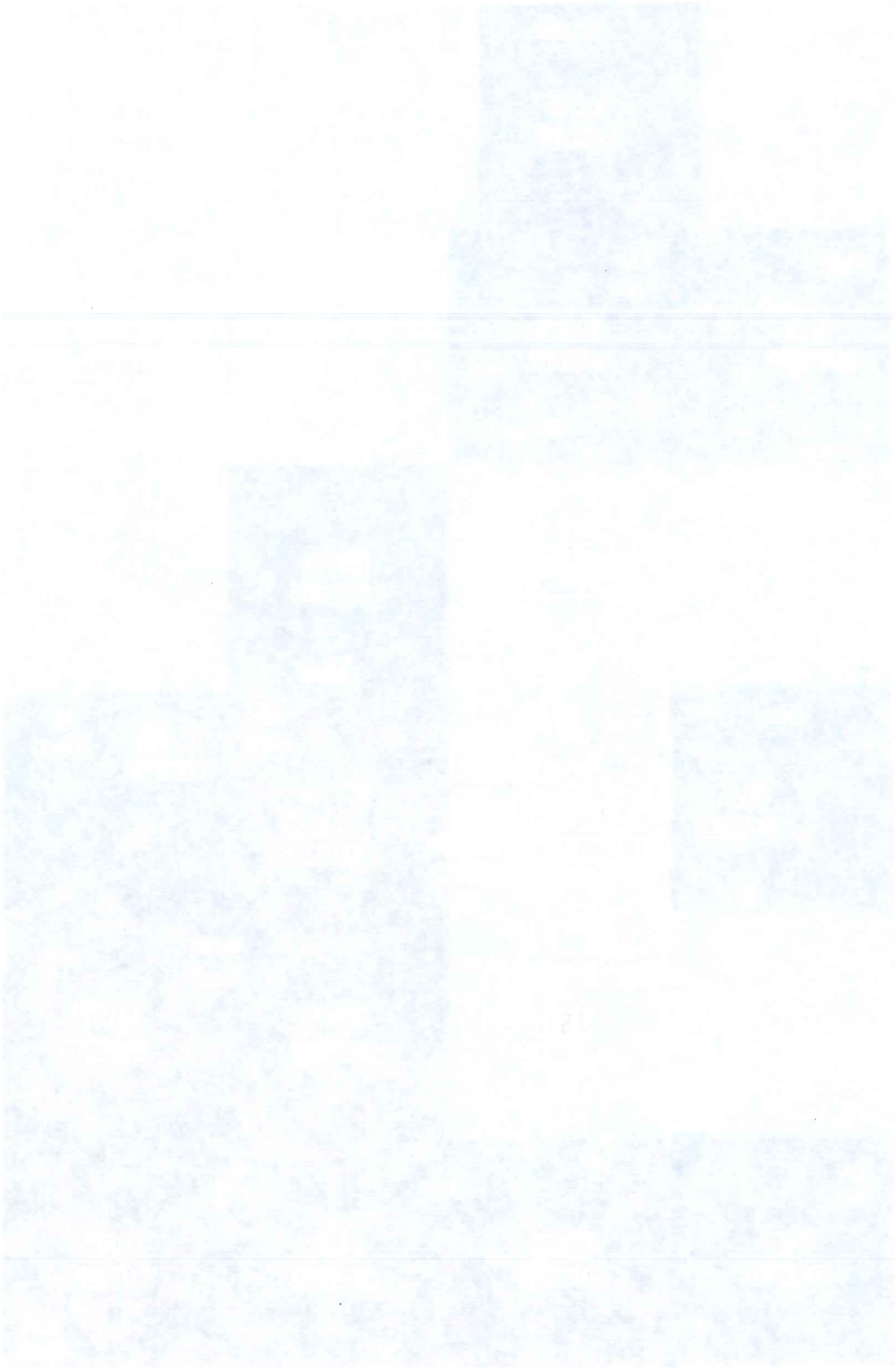
0 - 10.0%
10.1 - 30.0%
20.1 - 30.0%

*WI Nitrate Standard <10 mg/L

Sources:
Dunn County Health Department
Groundwater quality investigation of Dunn County, WI by I.D. Lippelt, 1987

Methods:
Nitrate sample results where aggregated by township and the percent of nitrate samples greater than 10 ppm was calculated.

Disclaimer: This map is not guaranteed to be accurate, correct, current, or complete and conclusions drawn are the responsibility of the user



Dunn County Groundwater Data

Dunn County Health Department

Current County Programs

- **Test Kits:** Available from Public Health and Zoning Homeowner pays for desired tests, sent to Colfax Lab
- **Safe-Water Testing:** Free for expectant families and w/newborns up to 1 yr (N, bacti, fluoride, metals)
- **Public Well Testing:** Transient non-community wells are tested annually by Public Health (Federal Safe Drinking Water Act)

Current County Programs, Continued

- **New Well Permitting:** By Environmental Public Health Department
- **Sanitary Permit:** by Zoning Division
- **Well Abandonment:** Cost sharing and technical assistance available through Land & Water Conservation Division
- **Groundwater Quantity:** Eight Wellntel water level monitors installed on wells throughout the county

Data Sources - Granular Data, Quality

Source	Time Period	Data Type
WI Geological Survey	1986-1987	Nitrate
Land Conservation: *Baseline Study*	1990-1995	Nitrate
Public Health: Community *Health Foundation Grant and Environmental Health Data Tracking Grant*	2003-2005	Nitrate
Dunn County Public Health: *well-water test kits for families w/newborns*	2000-Present	Nitrate, bacteria, fluoride
Eau Claire County Health Dept. lab	2010-2018	Many variables, varies by sample
WI DNR	1989-Present	Many variables, varies by sample, mostly bacteria & nitrate

Data Sources - Granular Data, Quantity

- Wisconsin DNR - well construction reports & high-capacity well reports
  - Variables include date drilled, well depth, pumping rate (for hi-cap wells), and static water level
- WellIntel monitoring wells in Dunn County (8 wells)

Data - Spatial (map-able*)

- New private well locations, *Dunn County Public Health*
- Existing private wells, *DNR*
- Public & TNC well locations, *Dunn Co. Public Health*
- Long-term monitoring wells, *DATCP*
- High capacity wells, *DATCP*
- CAFOs, *DNR*
- Contamination locations (outdated?), *DNR*
- WellIntel water level monitoring wells (qty. 8), *Dunn LWCD*

***Some of this data has already been mapped, some has yet to be mapped or is ongoing**

Data Sources - Reports

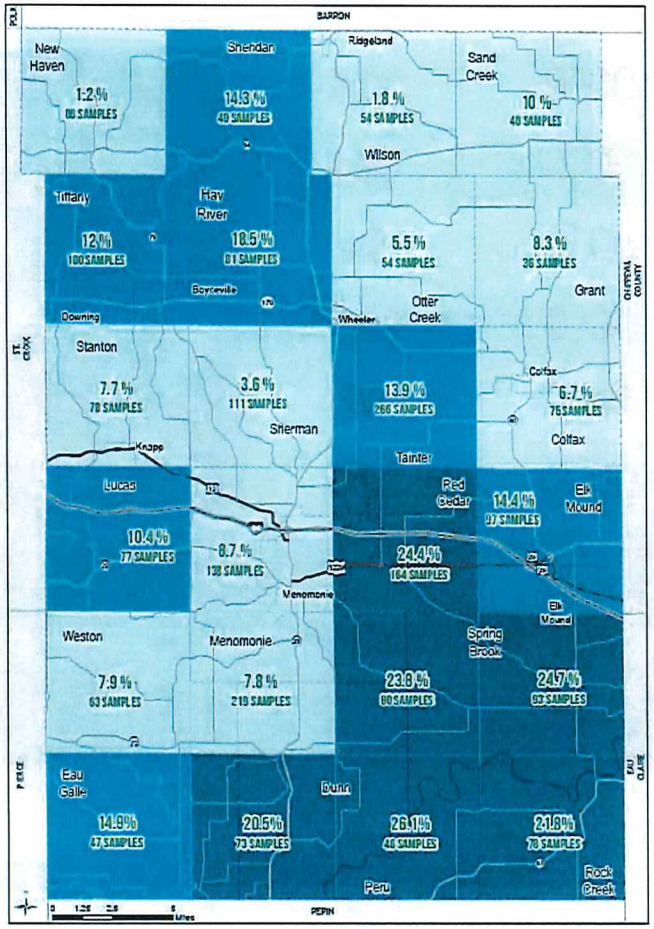
- Wisconsin DNR: *private & public groundwater reports*
- WI Dept. of Agriculture, Trade, and Consumer Protection Bureau of Agrichemical Management: *testing for ag chemicals in groundwater*
- UW-Extension Center for Watershed Science and Education: *Water and Environmental Analysis Lab, regional studies*

Private Well Nitrate by Township

Municipality	No. Samples	Average N	% Elevated (>=10 ppm)
TOWN of Spring Brook	149	7.4	28.9
TOWN of Rock Creek	69	6.2	26.1
TOWN of Red Cedar	181	6.4	24.3
TOWN of Eau Galle	73	5.1	23.3
TOWN of Peru	14	4.6	21.4
TOWN of Dunn	147	5.8	21.1
TOWN of Hay River	80	5.8	18.8
TOWN of Elk Mound	95	5	16.8
TOWN of Sand Creek	40	4.2	15.0
TOWN of Tainter	266	4.7	15.0
TOWN of Sheridan	49	4.4	14.3
TOWN of Tiffany	78	4.6	12.8
TOWN of Lucas	79	4.4	11.4
TOWN of Grant	36	3	8.3
TOWN of Stanton	77	3	7.8
TOWN of Weston	72	3.6	6.9
TOWN of Colfax	73	4	6.8
TOWN of Wilson	50	3.9	6.0
TOWN of Menomonie	270	2.9	5.6
TOWN of Otter Creek	54	2.8	5.6
TOWN of Sherman	112	2.8	4.5
TOWN of New Haven	86	2.5	1.2
COUNTY of Dunn	2,241	4.6	14.3

Private Well Data in Dunn County

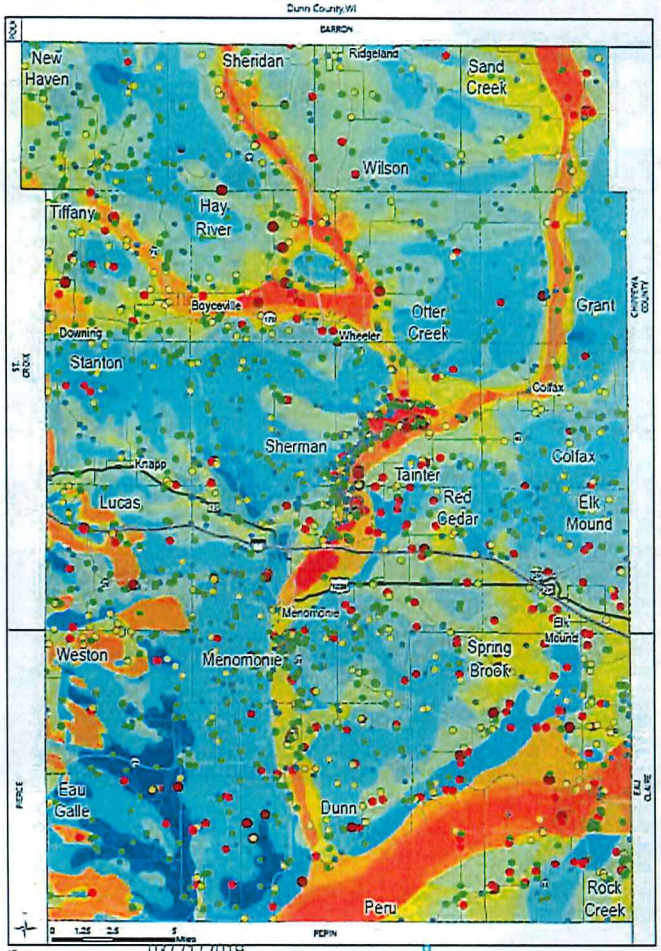
Percent of Private Well Samples Not Meeting WI Nitrate Standards (1987-2016)



Sources
Dunn County Health Department
Groundwater quality investigation of Dunn County, WI by I.D. Lippert, 1987
Methods
Private well sample results were aggregated by township and the percent of private well samples greater than 10 ppm was calculated.

Disclaimer: This map is not guaranteed to be accurate, correct, current, or complete and conclusions drawn are the responsibility of the user

Groundwater Contamination Susceptibility & Private Well Nitrate Levels (1987-2016)



Sources
Dunn County Health Department
Groundwater quality investigation of Dunn County, WI by I.D. Lippert, 1987
Wisconsin Dept. of Natural Resources
Groundwater Contamination Susceptibility Model Data Set 2001

Disclaimer: This map is not guaranteed to be accurate, correct, current, or complete and conclusions drawn are the responsibility of the user

Nitrate by Land Use

Land Use	No. Samples	Min N	Max N	Average N	% Elevated (>10 mg/l)
Agriculture	603	0.00	39.00	5.93	21.72
Barren	38	0.00	22.60	3.96	15.79
Urban/Developed	475	0.00	33.60	4.66	15.37
Wetland	15	0.00	23.90	5.56	13.33
Grassland	520	0.00	31.50	4.27	11.92
Forest	554	0.00	43.60	3.29	7.40

Nitrate by Groundwater Recharge Rating

Description	No. Samples	Min N	Max N	Average N	% Elevated (>10 ppm)
Excellent	465	0.00	35.00	5.10	17.63
Very Good	352	0.00	31.00	4.26	12.50
Good	573	0.00	43.60	5.14	18.15
Fair	433	0.00	32.00	3.58	9.47
Poor	375	0.00	39.10	4.41	11.20

DNR Private Well Nitrate Data Summary

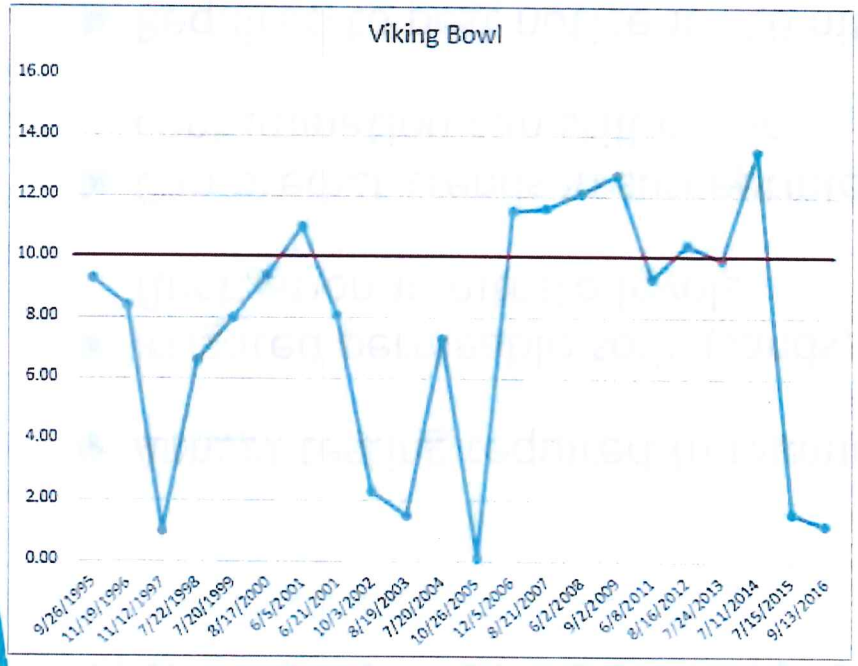
	No. Samples*	No. Elevated (>10 ppm)	% Elevated (>10 ppm)
1990s	20	3	15.0%
2000s	149	21	14.1%
2010s	41	7	17.1%
All Time	210	31	14.8%

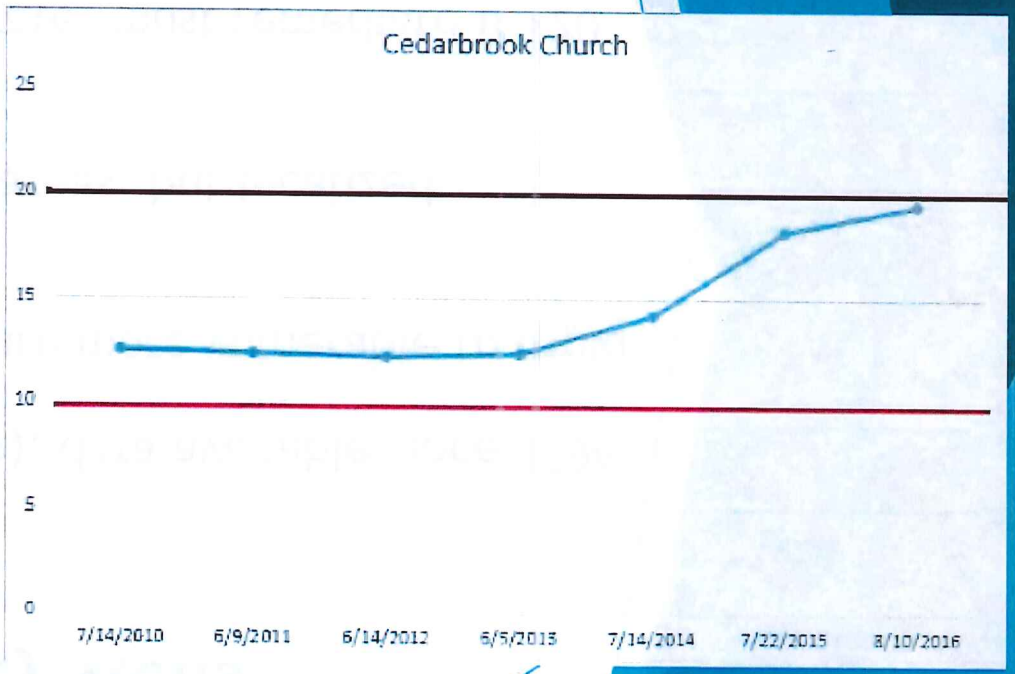
*Some wells may have been tested multiple times

Transient Non-Community Wells

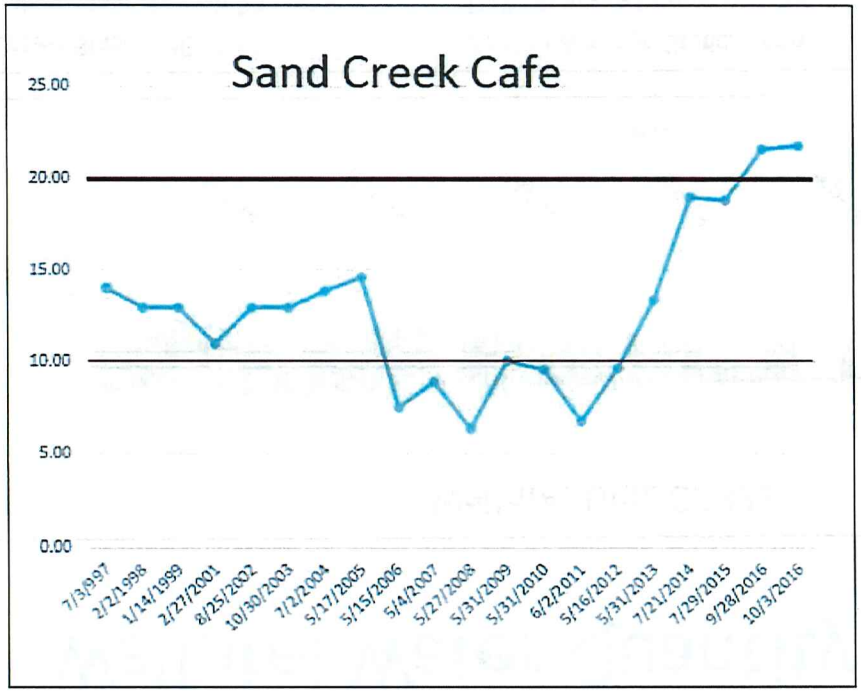
- Annual testing required (minimum), data available since 1996
- Irrigated permeable soils (sands) are more vulnerable to rapid fluctuation in nitrate levels
- Can predict trends in susceptible areas, but localized contamination can still occur
- Required to post notice if >10 nitrate, must remediate if >20 ppm nitrate or any bacteria presence

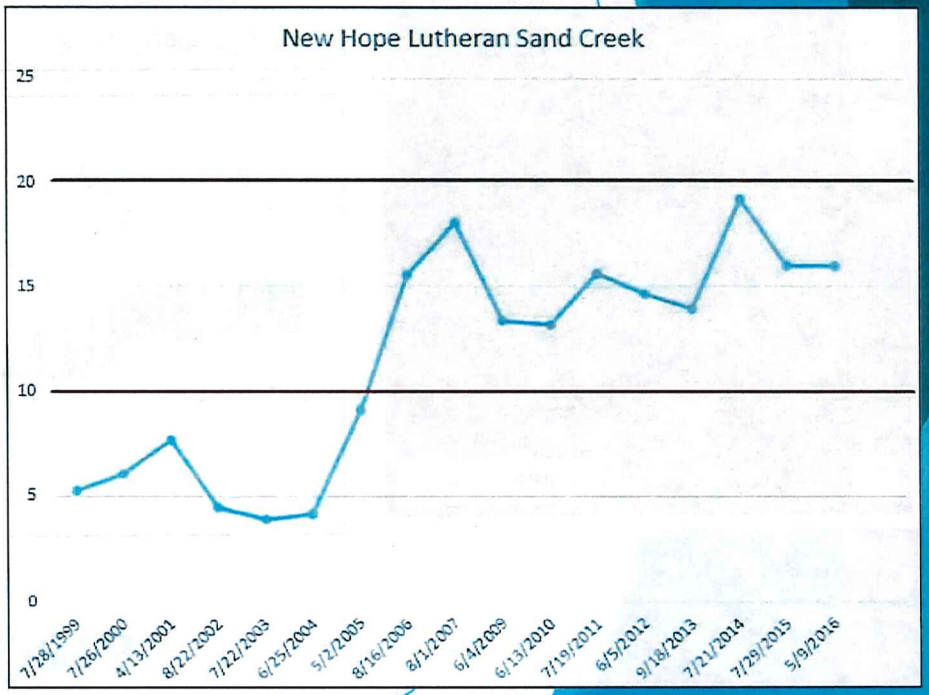
Transient Non-Community Well Trends



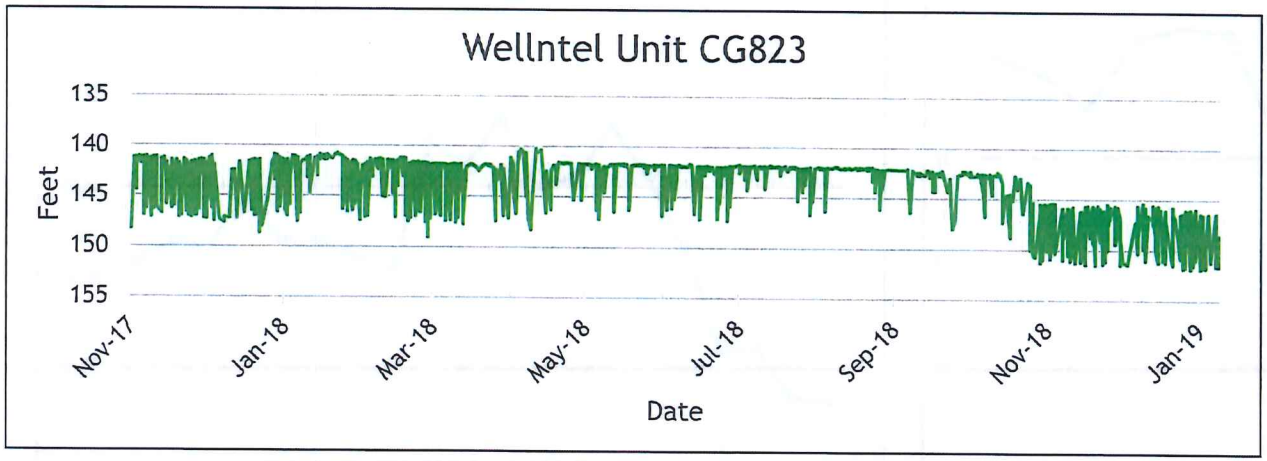


Sandpoint Wells in Susceptible Areas

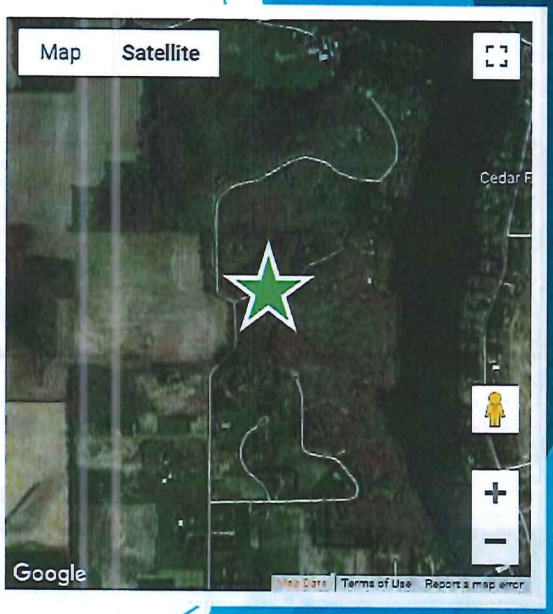




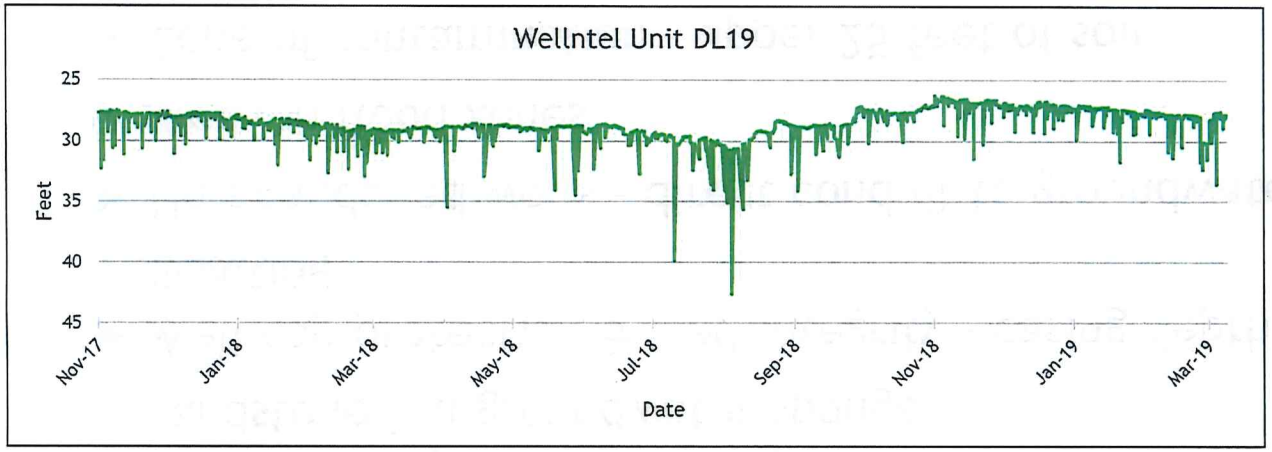
Wellntel Water Quantity Data



Latest Static: 146.11 Ft	30-Day Average Static: None	Pump Depth: 175.00 Ft
Latest Static At: Feb 03, 2019	Daily Average Pumping: None	Well Depth: 225.00 Ft
Today's Average Static: None	30-Day Average Pumping: None	



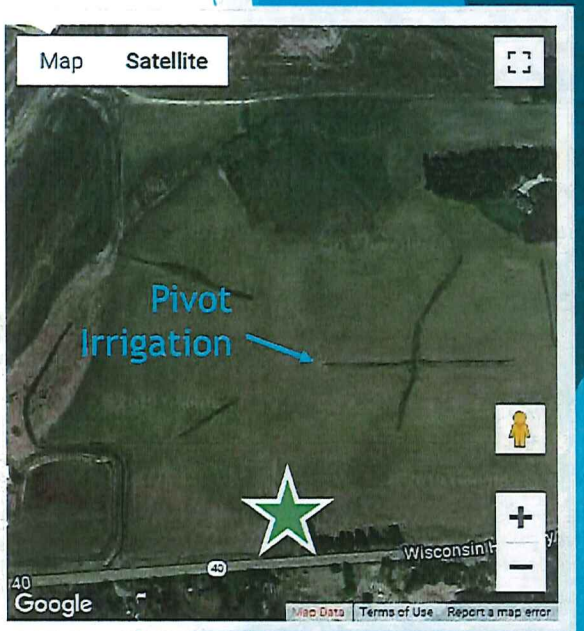
Wellntel Water Quantity Data



Latest Static: 27.91 Ft
Latest Static At: 09:52 AM CDT
Today's Average Static: 27.84 Ft

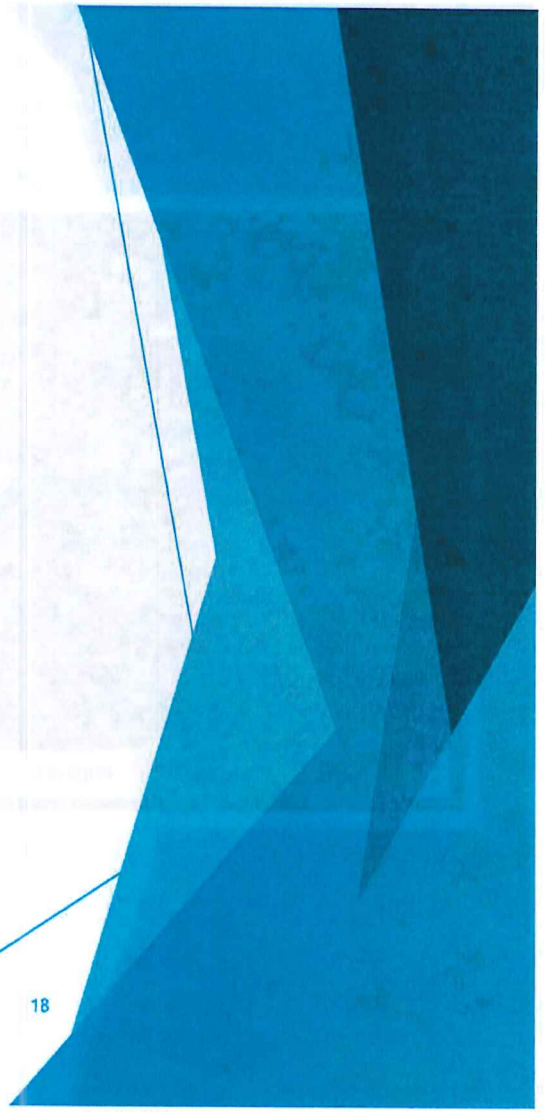
30-Day Average Static: 28.24 Ft
Daily Average Pumping: None
30-Day Average Pumping: None

Pump Depth: None
Well Depth: 135.00 Ft



What About Bacteria?

- Trends not apparent with mapping
- Sandstone aquifer/bedrock (Not limestone or karst) - sandstone is a groundwater sponge
- Well cap protection & well integrity - casing depth and grouting
- Un-abandoned wells - direct conduit to groundwater
- Wells in flood zones
- Zone of contamination - upper 25 feet of soil
- Local vs. regional influences



Ongoing/Future Data Efforts

- Develop accessible comprehensive database to store groundwater data from various sources
- Map wells from Well Construction Reports (1988 - present)
  - Map bedrock type & depth
  - Map static water level = groundwater elevation
- Continue to acquire and map nitrate data as it comes in
  - Track changes over time
  - ID regional patterns related to local land use changes
- Acquire/analyze/map contaminant source data

Roles within County Departments

- Public Health
  - Health-related resources & education
  - Family well testing
  - Transient non-community well testing
  - New well permitting
- IT & Land Information Services
  - Develop database
  - Map groundwater data
  - Develop platform for sharing data w/public
- Environmental Services
  - LWCD - Water Quality Specialist position: education/outreach, data analysis, website, etc.
  - LWCD - well abandonment
  - Zoning - plan and enforce zoning regulations
  - Planning - land use planning, environmentally sensitive areas

DISCUSSION

Appendix C:

References/Literature Review

Health Impacts of Nitrate: a Limited Literature Review for Dunn County Ad Hoc Groundwater Committee

Blue Baby Syndrome (Methemoglobinemia)

Methemoglobinemia (MetHb) is a blood disorder in which an abnormal amount of methemoglobin is produced. Hemoglobin is the protein in red blood cells that carries and distributes oxygen to the body. Methehemoglobin does not carry oxygen in the same way as hemoglobin does, and can result in inadequate blood oxygen levels and cyanosis (bluish discoloration of the skin). It can be caused by genetic defects, some medications or chemical ingestion through food or drinking water.[1]

Nitrate in drinking water is associated with Methemoglobinemia in vulnerable people like infants and pregnant women. There are many factors that influence nitrate in drinking water causing Blue Baby Syndrome: the concentration of nitrate, the pH of a baby's GI tract, the normal bacteria in a baby's mouth and (normal and abnormal) bacteria in baby's GI tract and bacteria contamination in drinking water.

Case studies of two infants with Blue Baby Syndrome were documented in the Journal of Environmental Health Perspective in 2000. A 6 month old from Columbia County Wisconsin was diagnosed with Blue Baby Syndrome in 1998. The private well had a nitrate-N concentration of >30ppm. A three week old from Grant County Wisconsin was diagnosed with blue baby syndrome after the family used boiled well water for formula after running out of bottled water. The private well had a nitrate-N concentration of >24ppm and was bacteriologically unsafe. Boiling the water had the effect of killing the bacteria, but concentrating the nitrate.[2]

Colorectal Cancer

In a national Danish study explored the association of nitrate in drinking water with cases of colorectal cancer (CRC) occurring between 1978-2011. A total population of 1.7 million people were identified as high risk for CRC. Over 5,900 cases of CRC were identified. In this large study they found a statistically significant increase in risk at drinking water levels above 3.87mg/L (ppm). [3]

In a Spanish study, >1,860 cases cancer of colorectal cancer (CRC) from 2008-2013 were matched with Spaniards that did not have diagnosed CRC. They looked at both nitrate consumption from water and diet. They looked at historical water testing data and took food histories. The findings indicate that CRC risk is increased for waterborne nitrate intake at levels below current international guidelines (<5ppm), particularly in subgroups with other risk factors. Nitrate intake from animal sources was further associated with increased rectal cancer risk. [4]

Adverse Reproductive Outcomes

A review of 12 different maternal nitrate drinking water studies was conducted by scientists at the Centers for Disease Control (CDC) in 2006. They acknowledged well-documented adverse reproductive health outcomes in animals due to nitrate/nitrite ingestion, including low birth weight, birth defects, stillbirths and spontaneous abortion. However, after reviewing the studies they believe that while there is a correlation between nitrate and adverse reproductive outcomes, a direct causal relationship is hard to prove. They recommend direct

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1 "Methemoglobinemia" by H. Ur Rehman, 2001, Journal of Western Medicine

2 "Blue Babies and Nitrate-Contaminated Well Water" by L. Knobeloch, B. Salna, A. Hogan, J. Postle, and H. Anderson, et. al. 2000, Journal of Environmental Health Perspectives

3 "Nitrate in drinking water and colorectal cancer risk: A nationwide population-based cohort study" by J. Schullenhner, B. Hansen, M. Thygesen, C. Pedersen, and T. Sigsgaard, et al. 2018, International Journal of Cancer

4 "Colorectal cancer risk and nitrate exposure through drinking water and diet" by N. Espejo-Herrera, E. Gracia-Lavedan, E. Boldo, N. Aragones, B. Perez-Gomez, et al. 2016, International Journal of Cancer

testing for exposure to other contaminants in well water to rule out other possible causes or confounding variables.[5]

Data from the National Birth Defects Prevention Study was analyzed in 2013 looking for a connection between nitrates in drinking water and specific birth defects. The retrospective case control study looked at a population of over 3,300 mothers who had children with birth defects and matched them with 1100 control mothers who had children without a diagnosed birth defect. They found that the mother's consumption of drinking water nitrates at >5ppm pre conception was associated with spina bifidia, and during pregnancy was associated with cases of limb deficiency, cleft palate, and cleft lip.[6]

Breast Cancer

In a small Spanish study, >1,200 women with diagnosed breast cancer from 2008-2013 were matched with women that did not have diagnosed breast cancer. They looked at both nitrate consumption from water and diet. They looked at historical water testing data and took food histories. The study found that while nitrate in drinking water was not overall associated with breast cancer incidence. However, they do find that there was an association consumption of elevated nitrates in drinking water AND higher dietary consumption and breast cancer in older, post-menopausal women.[7]

Bladder Cancer

A national study examined the link between bladder cancer in postmenopausal women in Iowa from 1986 to 2010. They identified 258 cases of bladder cancer among the >34,000 postmenopausal women followed. Long-term ingestion of elevated nitrate in drinking water was associated with an increased risk of bladder cancer among postmenopausal women. This association was especially noted among current smokers.[8]

Recent Overview

A 2018 review of the literature, study designs and data by M. Ward et al. resulted in a comprehensive overview of health impacts of nitrate in drinking water and recommended areas of further study. Considering all studies, the strongest evidence for a relationship between drinking water nitrate ingestion and adverse health outcomes (besides Methemoglobinemia) is for colorectal cancer, thyroid disease, and neural tube defects. Many studies observed increased risk with ingestion of water nitrate levels that were below regulatory limits.[9]

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[5] "A Review of Nitrates in Drinking Water: Maternal Exposure and Adverse Reproductive and Developmental Outcomes" by D. Manassaram, L. Backer, and D. Moll, et al. 2006, Journal of Environmental Health Perspectives

[6] "Prenatal Nitrate Intake from Drinking Water and Selected Birth Defects in Offspring of Participants in the National Birth Defects Prevention Study" by J. Brender, P. Weyer, P. Romitti, B. Mohanty, and M. Shinde, et al. 2013, Journal of Environmental Health Perspectives

[7] "Ingested Nitrate and Breast Cancer in the Spanish Multicase–Control Study on Cancer" by N. Espejo-Herrera, E. Gracia-Lavedan, N. Aragones, and E. Boldo, et al. 2016, Journal of Environmental Health Perspectives

[8] "Nitrate from Drinking Water and Diet and Bladder Cancer Among Postmenopausal Women in Iowa" by R. Jones, P. Weyer, C. DellaValle, M. Inoue-Choi, K. Anderson, et al. 2016, Journal of Environmental Health Perspectives

[9] "Drinking Water Nitrate and Human Health: An Updated Review" by M. Ward, R. Jones, J. Brender, T. de Kok and P. Weyer et al. 2018, International Journal of Environmental Research and Public Health

Nelson Institute for Environmental Studies
UNIVERSITY OF WISCONSIN-MADISON

NELSON ISSUE BRIEF

MAY 2019, VOLUME 1, NUMBER 1

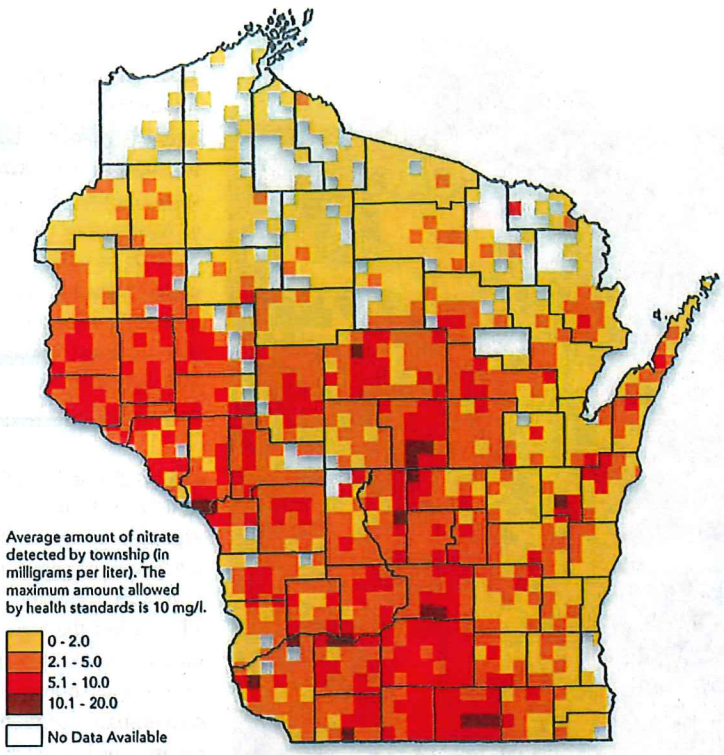
NITRATE CONTAMINATION IN DRINKING WATER AND GROUNDWATER

INTRODUCTION

Safe drinking water has become a major bipartisan priority in Wisconsin. Governor Tony Evers has declared 2019 the year of Safe Drinking Water and Assembly Speaker Robin Vos has commissioned a taskforce on Water Quality. This inaugural edition of the Nelson Institute for Environmental Studies Issue Brief focuses on the most widespread groundwater contaminant: Nitrates. This is an environmental and public health hazard faced by Wisconsinites statewide.

The great majority of the state's drinking water comes from groundwater wells, and approximately 940,000 households are served by 676,000 private wells for which no testing is generally required. The state's Groundwater Coordinating Council estimates that 42,000 private wells across the state have nitrate concentrations above 10 parts per million—the level considered unsafe for consumption by the U.S. EPA. The Wisconsin Department of Health Services (DHS) considers nitrate exposure at this level to pose a serious risk of metabolic and neurological disorders in infants. In addition, DHS cites that some studies suggest that high levels of nitrates may be linked to birth defects, thyroid problems, and certain kinds of cancer.

UW–Madison faculty are doing research relevant to this public health and environmental challenge, and are available to local governments and state leaders as they consider the ways to limit groundwater contamination while minimizing impacts to farm income and residential property rights. We hope these research summaries will stimulate linkages between the UW community and Wisconsinites statewide who are facing water quality problems and looking for answers grounded in world-class research. Please reach out to the researchers highlighted in this report if you have further questions about their work.



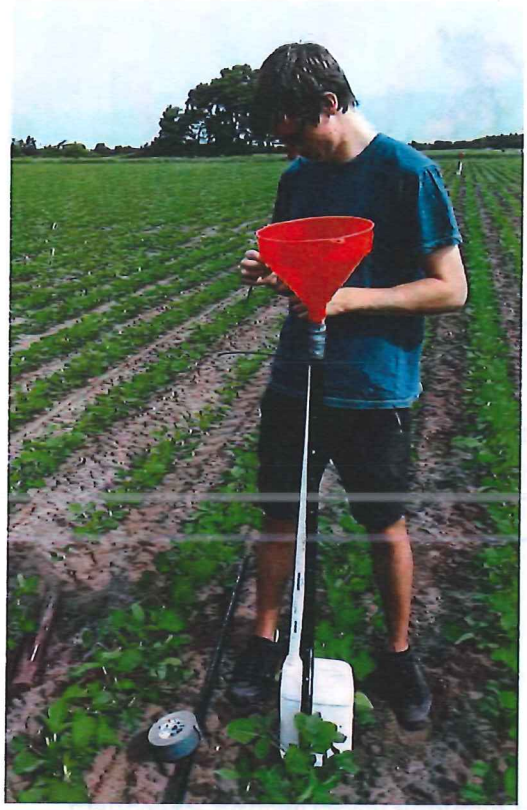
Nitrate in drinking water around Wisconsin

Nitrate levels are too high in wells used by an estimated 94,000 Wisconsin households that have private water wells. Agricultural areas and those with porous bedrock or sandy soil are most susceptible to nitrate contamination. It comes from fertilizers, including manure and other sources.

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

KEY POINTS

- Understanding nitrate content in groundwater can help farmers manage their nitrogen application more efficiently.
- Groundwater nitrate contamination is a product of manure, fertilizer, and septic systems.
- Changes in agricultural practices to reduce nitrate applications can have significant impacts on groundwater quality.
- Increased well monitoring of private wells and septic system mapping better informs decisions about where to locate septic systems.
- Collaboration among state agencies, the University and farmers is key to understanding and addressing groundwater quality issues.



Liam Dangeur, Undergraduate student at UW-Stevens Point, prepares the water collection instrument. Photo credit: Kevin Masarik, UW-Stevens Point.

WHAT DRIVES NITRATE LEACHING INTO GROUND WATER?

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"Nitrate leaching" is the process of nitrate moving from the land surface into groundwater, and it is the primary cause of nitrate contamination in groundwater. The amount of synthetic fertilizer and manure applied to the land is the most important driver of nitrate leaching. We know through fertilizer sales data that fertilizer nitrogen application rates have increased since the 1950s and have continued to rise more slowly since 2002. The limited data on manure nitrogen application reveals that nitrogen from manure applications is similar in magnitude to nitrogen from synthetic fertilizers.

Does changing nitrogen application change nitrate leaching? Changing the land cover can have a large impact because different amounts of nitrogen are taken up by different plant communities. For instance, our simulations of Midwestern cropping systems show higher levels of nitrate leaching under corn than under soybeans. Simulations of the Yahara watershed in south-central Wisconsin show that increased coverage of perennial grasses and decreasing nitrogen applications result in decreased nitrate leaching.

Nitrate research in the Central Sands. The Wisconsin Central Sands (WCS) is a major vegetable producer, but due to the region's sandy soil, irrigation is required in combination with applications of nitrogen fertilizer. This makes the region prone to leaching of nitrate and groundwater contamination. Irrigation water drawn from wells that tap into contaminated groundwater is already high in nitrate, but it is unclear how nitrate levels in groundwater change across space and time. Thus we want to know how to account for the nitrogen applied through irrigation water, as opposed to the nitrogen directly applied through fertilizer, in farmers' mandatory nitrogen management plans. By accounting for irrigation-water nitrogen, farmers may be able to reduce synthetic fertilizer applications, saving money while reducing nitrate losses to the groundwater system. Additionally, crops' efficiency in using water and nitrogen will shift with a changing climate, which may change how we can reduce nitrate leaching to groundwater.
Kucharik research: https://www.kucharik-lab.com/

UWLandLab and Grassland 2.0. Managed grazing using perennial grass systems across Wisconsin can reduce nitrate leaching while also providing a sustainable livelihood for dairy and beef producers in a challenging economic environment. In the UWLandLab we (along with Claudio Gratton, Michael Bell, and Bradford Barham) work with farmers, scientists, distributors, processors, and consumers to incentivize moving livestock production toward perennial grassland grazing. UWLandLab aims to serve as a roadmap for those interested in moving from input-intensive annual cropping systems towards perennial grassland-dominated landscapes, a vision we call Grassland 2.0.

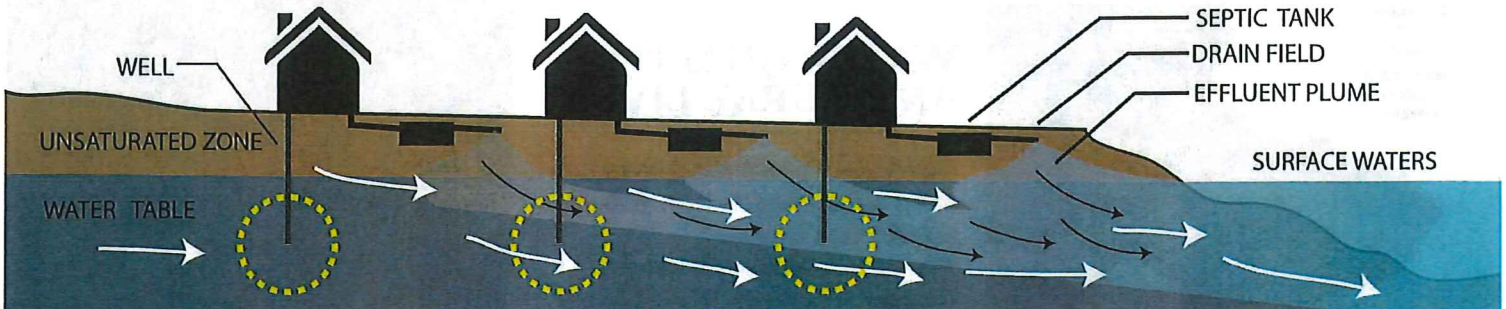
Through both field-testing and modeling, we hope to provide the tools to improve groundwater quality and reduce water use. Both will be important as increasing weather variability makes water resources management and nitrogen applications to crops more challenging.
Jackson research: https://jacksonlab.agronomy.wisc.edu/

WHAT AFFECTS A RURAL TOWN'S WELL WATER?

Michael Cardiff, Department of Geology, UW-Madison; cardiff@wisc.edu

Like many smaller municipalities in Wisconsin, Spring Green, in Sauk County is experiencing increasing nitrate concentrations in the wells supplying its drinking water. Through DNR-funded research, we measure nitrate entering the groundwater under different management conditions and crop types. We are also working with farmers near Spring Green to assess how climate and agricultural practices contribute to the nitrate leaching to groundwater beneath agricultural fields. Farmer participation is crucial to the success of this project. We have found that consistent communication with farmers about our goals, experimental plans, and preliminary findings has helped to build trust in this relationship and avoid interference with farm operations. Farmers can supply vital specialized information, including records of irrigation, nutrient applications, and planting plans.

We use edge-of-field wells and an inert tracer in order to calculate net nitrate leaching from fields. In Spring Green we have quantified the contribution of a portion of a field to nitrate in groundwater as climatic conditions, crop plantings, and fertilizer applications have all varied. We will ultimately develop a dataset capable of relating nitrate mass loss from fields to climate, crop, and fertilizer management conditions. We will thus produce a real-world database as a basis for recommending agricultural "best practices" for nitrate management. This data will also help municipalities determine economical methods for reducing nitrate concentrations at municipal wells, which may include incentivizing change in crop types, revised fertilization rates, land purchases, or deepening of water supply wells.
Cardiff research: http://geoscience.wisc.edu/geoscience/people/faculty/michael-cardiff/



Conceptual diagram showing that housing spatial patterns may exacerbate groundwater contamination risks for private wells and surface waters located "down gradient" from unsewered housing clusters. Not to scale.

HOW DENSE SHOULD SEPTIC SYSTEMS BE?

James LaGro, Jr., Department of Planning and Landscape Architecture, UW-Madison; jalagro@wisc.edu
Bradley T. Vowels, Department of Planning and Landscape Architecture, UW-Madison; vowels@wisc.edu

Septic systems collect, treat, and release wastewater into the groundwater. According to the U.S. EPA, failing septic systems are the second greatest threat to groundwater quality. Densely-clustered systems can introduce nitrates, bacteria, and viruses into local water resources. We identified housing clusters in southeastern Wisconsin that may pose risks of groundwater contamination.

Wisconsin's plumbing code allows rural houses to be served by private wells and on-site septic systems. Land-use policy now allows clustered housing development on rural sites that were once considered unsuitable for septic systems due to environmental constraints, but such clusters can create "hot spots" of groundwater contamination. At a density of two septic systems per acre, the estimated annual nitrate loading is equivalent to the nitrate leached from one acre of corn field. This contamination may cause private wells to exceed the EPA's maximum contaminant level, but may go unnoticed since less than 10 percent of such wells are tested annually.

Local land use regulations in Wisconsin typically require minimum lot sizes of at least 0.5-acre for new rural homes served by septic systems. But in Ozaukee County, 624 acres of residential subdivisions exceeded this per-acre septic density in 2010. About 42 percent of this land is classified as having "high" groundwater vulnerability. About 200,000 septic systems in Wisconsin predate current regulations, and many of these systems have reached the end of their functional lives. As of 2015, 38 percent of septic systems in Ozaukee County were installed before permitting requirements were adopted in 1971. There is little information on the performance of these older systems.

Periodic well monitoring and septic system maintenance can help households protect their drinking water. For local governments, GIS analyses of existing septic systems and land suitability can ensure that future septic systems minimize risks to the environment and human health.

LaGro research: https://dpla.wisc.edu/staff/james-a-lagro-jr/

HOW DOES THE RESIDENTIAL DEVELOPMENT OF FARMLAND AFFECT NITRATE IN GROUNDWATER?

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Stephanie DeVries, Wisconsin Geological and Natural History Survey, UW-Madison Division of Extension; stephanie.devries@wgnhs.uwex.edu

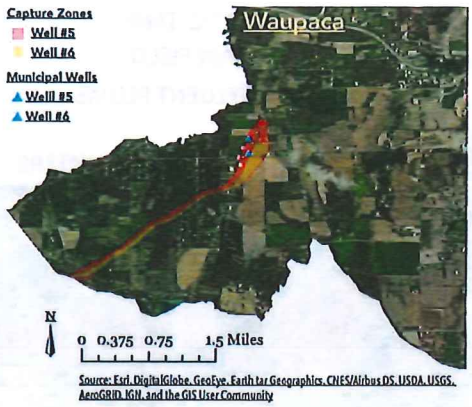
What happens to groundwater when rural farmland is converted to residential homes with on-site septic systems? We use monitoring and flow modeling to understand the relationship between land use and nitrate contamination in groundwater.

Savannah Valley – Near Sun Prairie. We monitored groundwater quality for 10 years in Savannah Valley, a 78-acre unsewered subdivision in south central Wisconsin. We used groundwater monitoring wells measuring nitrates in both a shallow gravel and a deep bedrock aquifer. Monitoring began in 2002 while the site was primarily used for corn, soybean, and alfalfa production, and continued as it was converted to residential homes.

Groundwater testing near Sun Prairie, Wis. Photo credit: Ken Bradbury

Prior to development, groundwater quality showed high variability in both space and time. Nitrate in the shallow wells exceeded 10 mg/l in some wells, and there was evidence of other effects from agricultural use and highway salting in many wells. Concentrations in deeper wells, although lower and less variable, also showed evidence of impacts from land use.

Between 2002 and 2013, nitrate concentrations showed statistically significant decrease in 6 of 12 (50 percent) of the wells most frequently sampled. In 2002, seven wells exceeded the 10 mg/l (as N) nitrate standard; in 2013 only one well exceeded the standard. With decreased use of agricultural fertilizers and manure in farm fields as land use has changed, nitrate levels have substantially decreased in over half the wells sampled.



WATER QUALITY AND RURAL LIVES

Angel Polanco, Centro de Investigaciones Regionales de la Universidad Autónoma de Yucatán; polanco07@gmail.com
Kata Beilin, Department of Spanish and Portuguese, UW-Madison; kobeilin@wisc.edu

City of Waupaca. Nitrate concentrations in a municipal well field serving Waupaca, Wisconsin have demonstrated large spatial and temporal variability, and data between 2006 and 2018 show that maximum annual concentrations are increasing. In order to understand how nitrate reaches Waupaca's municipal supply we need to identify land areas where water infiltrates and flows towards the well, areas known as the well's "capture zone".

We developed a model to simulate groundwater flow through a 26 square mile watershed contributing to the Waupaca wells in order to find the capture zone. We found that the capture zone providing water to Waupaca's well within one year (the "short-term capture zone") is covered by unsewered residential areas and cultivated cropland. Changes to this pattern of land uses may thus result in significant changes to well water quality. Other research has shown that targeted land management changes have proven effective in reducing groundwater nitrate concentrations.

Our research finds that long-term monitoring is necessary in order to draw conclusions about how nitrates in groundwater respond to land use changes and provides some guidance for land management approaches to reducing groundwater nitrate.
Bradbury research: https://wgnhs.uwex.edu/about/people/ken-bradbury/; Wisconsin Geological and Natural History Survey Webpage: https://wgnhs.uwex.edu/

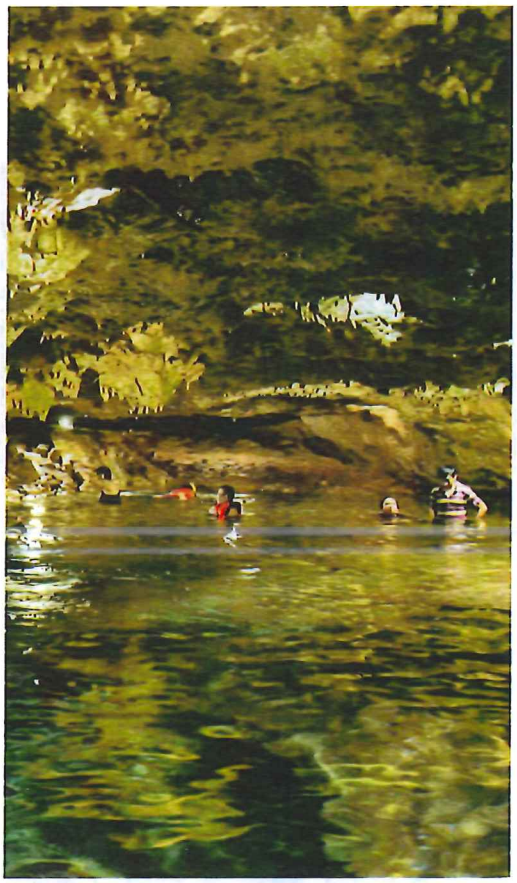
Nutrients used in industrial agriculture transform landscapes and affect rural livelihoods worldwide. We focus on people's understanding of the pollution of water by nitrogen fertilizers in agriculture. Public awareness and response are a crucial part of understanding any public health crisis.

Parts of the Mexican state of Yucatan are classified as extremely vulnerable to aquifer contamination due to bedrock with rapid groundwater flow, in which contaminants quickly move into groundwater wells. As in Wisconsin, a large part of the rural population gets their water from groundwater wells.

Yucatan lacks the infrastructure for large-scale sanitary engineering and providing safe drinking water. Analysis of well water found concentrations of nitrates in Yucatan's agricultural zone that are far above levels allowed by national and international norms. Average concentrations were at 102 ppm and peak concentrations of 141 ppm, over ten times the US EPA's limit of 10 ppm.

This high concentration suggests strong negative repercussions for the public health and safety of the ethnically Mayan agricultural regions of Yucatan, where the rates of cancer, congenital deformities, and neural deficiencies are high.

Mayan activists have focused political attention on the link between agricultural practices and human health. Alliances of scientists, international foundations, and Mayan leaders who denounce the use of chemical fertilizers. This has led in turn to interest in reviving ancient Mayan sustainable agricultural practices such as milpa (cyclical fallowing through forest regeneration). Water quality concerns also lead to a focus on protecting cenotes – groundwater-fed lakes beneath sinkholes in a karst landscape which are sites of deep spiritual significance and recreation. Water quality concerns reach every aspect of life in rural Yucatan and water quality is inseparable from rural life and health.
Beilin research: https://spanport.wisc.edu/staff/beilin-katarzyna-olga/



Underground cenote in Yucatan.
Photo credit: Creative Commons

RESOURCES

Wisconsin Assembly Speakers Task Force on Water Quality
https://legis.wisconsin.gov/2019/committees/assembly/STF-WQ/

Wisconsin Groundwater Coordinating Council Report
https://dnr.wi.gov/topic/groundwater/documents/GCC/Report/FullReport2018.pdf

Kewaunee County Groundwater Workgroup Report
http://www.co.kewaunee.wi.gov/docview.asp?docid=21000&locid=192

Wisconsin Department of Health Services Nitrate Information Page
https://www.dhs.wisconsin.gov/water/nitrate.htm

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Water Quality Taskforce
Recommendations

AGENCY HEARING – March 20, 2019

Department of Natural Resources:

- Water Quality Issues Identified
  - Lead, Nitrate, Bacteria and viruses and other pathogens, Arsenic, Radionuclides, Other Inorganic & Organic Compounds, Emerging Contaminant
- Lead
  - Provide additional funds to water utilities specifically for LSL replacements beyond what is currently available in the federal safe drinking water loan program.
  - Provide funding for lead removal in schools and daycares to supplement the new U.S. EPA grant program funding for lead testing.
  - Leverage the safe drinking water loan program to provide increased capacity for funding of all project types, including LSL replacements.
- Nitrates
  - Identify sensitive areas based on geology and soils where nitrate is present in groundwater.
  - Modify well compensation program to allow for funding private well replacement for low-income well owners where nitrates exceed 10 mg/L.
  - Implement nitrate initiative pilot recommendations, including developing a nitrate fertilizer decision support tool for nutrient management protective of groundwater quality.
- Emerging Contaminants
  - Research staff and funding – develop a model to identify and prioritize PFAS contamination sites – conduct fire-fighting foam survey and develop best management practices.
    - Need to: Better understand probable sources of PFAS in Wisconsin. Better understand the fate and transport of PFAS in the environment. Evaluate health effects and set appropriate groundwater, drinking water and surface water standards in Wisconsin. Develop new analytical methods to detect PFAS in drinking water, wastewater, surface water and soil. Develop a PFAS risk communication protocol
  - Establish multi-media clean-up standards.
  - Evaluate what other states are doing to identify PFAS sources, impacted citizens and the environment
- Nonpoint Source Pollution
  - Fully implement statewide and targeted performance standards and prohibitions (via NR 151)
  - Consider additional targeted performance standards.
  - Expand partnerships with DATCP, county governments, and municipalities on outreach efforts and develop innovative practices.
- Nutrient Loading
  - Funding for planning, outreach, and implementation.
  - To further DNR's effort to implement these compliance options, additional funding to help WPDES municipal facilities investigate and apply for these compliance options is needed.
  - Additional staff positions to provide advice to WPDES permittees on navigating these compliance options would also better serve the regulated community and likely result in quicker water quality improvements. Resources for outreach, consulting/compliance assistance, and project costs are needed.
  - Funding invested in the outreach component will assist WPDES permittees in overcoming the primary barrier to entry in these programs.
- Contaminated Sediment
  - Partnering on legacy contaminated sediment clean-ups.
  - Leverage state sediment bonding, local, and other non-federal funds with EPA GLRI Legacy Act funds.

Department of Health Services:

Water Quality Taskforce
Recommendations

- Prominent Water Contaminants Identified
  - Bacteria, Nitrates, Lead, Arsenic, Emerging Contaminants
- Bacteria
  - Explore methods to maintain adequate and stable levels of support for applied groundwater research.
  - Consider prioritizing projects addressing public health assessment and communication challenges associated with interpretation of data from microbial source tracking techniques.
- Nitrates
  - Improve alignment of funding and eligibility criteria of Well Compensation Program with current knowledge of groundwater-related health risks
  - Explore and promote innovative management strategies to reduce nitrate contamination of groundwater.
- Lead
  - Ensure adequate support for lead testing in schools and child care facilities.
- Arsenic
  - Support state and local agency community engagement efforts about arsenic and the importance of well testing.
- Emerging Contaminants
  - Support implementation of a state water quality monitoring strategy to assess for the occurrence of emerging contaminants.

Department of Agriculture, Trade, and Consumer Protection:

- Agrichemical Management Bureau (ACM)
  - Develop an electronic repository of ACCP case files for efficient, long-term record recovery.
  - Support DATCP, DNR and DHS in identifying groundwater standards for new pesticide compounds.
  - Support efforts of the Groundwater Coordinating Council and provide additional financial support for groundwater research projects.
- Land and Water Resources Bureau
  - Provide sufficient funding to support the county land conservation dept's role in implementing the agricultural performance standards.
  - Provide additional resources for nutrient management and bondable cost-share practices for farmers.
  - Maintain the increased level of financial support to Producer-led Watershed Protection Grants.
  - Work with agency partners and ag groups to increase training for and participation in nutrient management planning activities.
  - Work with partners to identify effective mechanisms for increased NM planning.
  - Identify additional incentives and structures to support development in Agricultural Enterprise Areas.
  - Expand Conservation Reserve Enhancement Program (CREP) eligibility to additional counties

Wisconsin Farm Bureau:

Water Quality Taskforce
Recommendations

- Themes identified:
    - Farmers are stewards of the land and are continuously improving their methods
    - Farmers support research
    - Farmers are committed to participating in the regulatory process
    - The ongoing need for scientific studies, including on-farm data collection
- Support increased investment in research dollars at UW-Madison and Cooperative Extension for applied agricultural research. Funding research and positions for state integrated research specialists.
    - In the last four years, funding for integrated research specialists at UW-CALS has decreased by $865,000 and resulted in the loss of eight specialist positions.
- Support the county Land and Water Conservation offices and collaborative work.
- Support ongoing implementation of the nonpoint source pollution program through increased cost-share funding to assist more farmers with implementing additional nonpoint source pollution practices.
- Support the development of targeted, science-based regulations that recognize the needs and challenges of different geographic regions of the state.
- Allow farmers to continue to help develop local water quality solutions by supporting grassroots water quality initiatives such as DATCP's Producer-led Watershed Grant program as one of the keys to success.
- Collection of on-farm data → UW Discovery Farms

Wisconsin Farmers Union:

- Themes identified:
    - Financial stress on farms
    - Nitrates
    - Bacteria, nutrients, chemicals → nonpoint runoff
- Incentivize farmers to adopt better management practices.
- Fully fund the agencies tasked with protecting public and environmental health so they can adequately enforce clean water standards.
- Research: we need to understand where we are seeing the biggest problems and what the major causes are.
    - conduct county-by-county groundwater testing and mapping.
    - Hearing from Minnesota County Geologic Atlas
    - Budget: Add 1 FTE ($150,000-$200,000) at the Wisconsin Geological and Natural History Survey to update groundwater maps. Provide $2.5 million/year for county-by-county groundwater mapping
- Remedies: we need to offer immediate help to anyone in the state who is currently drinking contaminated water.
    - Improve Well Compensation Grant Program. Increase number of eligible households, raise income eligibility requirement, households with nitrate-contaminated wells are eligible regardless of livestock ownership, prioritize households with highest levels of nitrate contamination
    - Budget Recommendations: Increase funding for well testing and remediation from $400,000 to $2 million/year.
- Prevention: state incentives for farmers to adopt better management practices, and we also recommend greater enforcement of clean water standards.
    - Managed grazing is the best management practice to control soil erosion and phosphorous pollution.
    - Restore Grazing Lands Conservation Initiative (2000-2010)
    - Budget recommendations: Add 1 FTE at DATCP dedicated to Grazing Education and Coordination, Restore Grazing Land Conservation Initiative competitive grants at $2 million/year, provide $200,000/year in Grazing Research and Education competitive grants for University and Extension grazing research.
    - Incentivize cover crops – Iowa

Water Quality Taskforce
Recommendations

  - Greater enforcement and higher standards by restoring local control of livestock siting, allowing areas with sensitive groundwater and geologic factors to adopt more stringent livestock siting standards, increasing CAFO monitoring and oversight at DNR
  - Budget Recommendations: Add $300,000 per year for CAFO monitoring and oversight at DNR
- Continue funding the Producer-Led Watershed Grant Program at $750,000 per year.
- Fully fund County Land and Conservation staffing grants at $12.4 million/year

Wisconsin Land & Water:

- Commitment to funding conservation and water quality initiatives
- Launch a robust effort to obtain a comprehensive and verifiable picture of conservation and water quality programs across the state, and across agency programs, optimizing and aligning all programs that affect water quality.
  - Evaluating progress toward implementation of statewide agricultural performance standards, identifying the financial commitment necessary to achieve implementation (including evaluating current cost-share funding levels), and assessing program tracking and verification.
- Fully fund DATCP county conservation staffing and support grants at a baseline of $12.4 million annually.
- Provide adequate financial support to groundwater mapping, outreach, and education.
- Support clean water initiatives in Governor Evers' proposed budget.
  - Increases in DATCP bonding for cost-share from $3.5 to $5 million annually.

Wisconsin Conservation Voters:

- Agriculture pollution
  - Ban on winter manure spreading
  - Expand NR 151 changes to additional sensitive areas
  - Increase CAFO fees
  - Cost-share: fund it or get rid of it for enforcement requirements
- Emerging Contaminants – PFAS
  - Shorten process for creating health protections when new contaminants are identified
  - Set standards for classes of chemicals, like PFAS
- Lead
  - Support $40 million in the Governor's budget to replace lead laterals.
  - Ensure all childcares and schools are leadfree.
  - Repeal limits on loans or grant amounts for lead lateral replacements.

Clean Wisconsin:

- The steps we take must support the goals of access, prevention, and provision of resources.
  - Does an action we take help people get access to the clean drinking water they deserve?
  - Does an action we take help prevent, reduce or eliminate pollution from occurring?
  - Are we providing the scientists, governmental entities, and other stakeholders that we entrust to make sure our water is safe now and in the future with the resources they need?
- Lead
  - Gov's budget proposal of $40 million in bonding to help families and communities replace lead service lines. DHS and DNR to have the resources they need to protect families from lead.
  - Exploring and recommending additional steps to remove and replace lead service lines as quickly and cost effectively as possible.
- Nitrates

Water Quality Taskforce
Recommendations

- The Governor's budget proposal of increased well compensation funding to help families access clean water by drilling new wells.
- The budget proposal to help farmers implement some conservation practices
- Resources for counties to assist farmers
- Funding to support producer led watershed groups.
- Raising permit fees for large farms and directs that money to DNR staff positions that will help oversee a permit program intended to reduce the risk of water contamination from the significant volumes of manure these farms handle.
- Invest in farmers we need to use conservation practices that have long been required of all farms but never adequately implemented or enforced.
- Fully implemented nutrient plans
- Farmland Preservation Tax Credit tie use value assessment, which helps farmers manage their tax burden, to the implementation of conservation practices.
- Limiting the amount of nitrogen, we put on certain fields

- PFAS
  - The Governor's budget proposal of 2 DNR science staff positions that will support and inform our state's response to PFAS contamination and allow the DNR to take steps like the development of clean-up standards.
  - Executing cleanup efforts now to make contaminated groundwater safe to drink again.
  - The state must work to provide access to safe drinking water to affected families
  - DNR and DHS must have resources to develop health-based standards for drinking water and better assess and track contamination occurrences
  - A robust commitment, in conjunction with manufacturers and users of PFAS, to clean up contaminated groundwater.

Wisconsin Corn Growers Association:

- "We will not be making recommendations to the committee today, but rather want to highlight the work that farmers are already implementing and the challenges they face in adopting these practices."
- Soil health partnerships
- "Programs such as Soil Heath Partnership, along with sound science from university trials, ag retailers and farmer ingenuity, need to be supported to resolve these issues."

Wisconsin Water Quality Association:

- Themes identified:
  - Lead, Arsenic, and PFAS
- Final Barrier solution – point of use or point of entry options