DEPARTMENT OF AGRICULTURE

September 10, 2019

Zumbro River One Watershed, One Plan Partnership
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Rochester, MN 55904

Dear Zumbro River One Watershed One Plan Partnership,

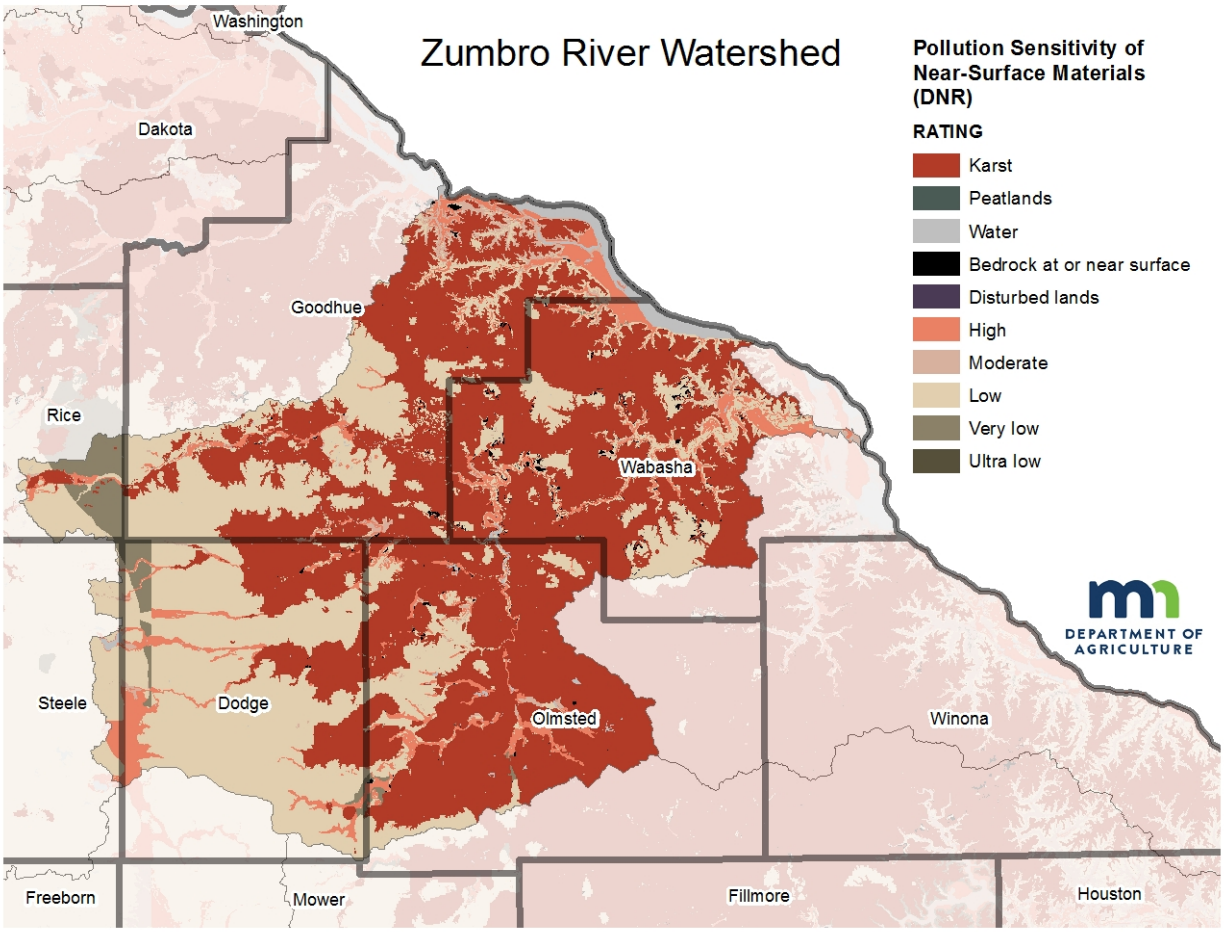
Thank you for the opportunity to provide priority issues for consideration in the development of the Zumbro River One Watershed One Plan (1W1P). The Minnesota Department of Agriculture (MDA) looks forward to working with local government units, stakeholders, and other agency partners in the planning process. One of the MDA's roles related to the 1W1P process is to provide technical assistance. The MDA maintains a variety of water quality programs including applied research, on-farm demonstrations, and groundwater and surface water monitoring. Our goal is to provide you with data from these programs to better characterize the watershed, identify key resource concerns and further engage the agricultural community at the local level.

Minnesota Department of Agriculture Priority Concerns
Nitrate-nitrogen and pesticides in groundwater are a priority resource concern for the MDA in this watershed.

The following is a list of pertinent activities, datasets, resources, and programs that the MDA has supported in the watershed to address these concerns. Please consider these activities and resources in the 1W1P development process for the Zumbro River Watershed.

Nitrogen Fertilizer Management Plan (NFMP)
The NFMP is the state's blueprint for preventing or minimizing the impacts of nitrogen fertilizer on groundwater. The original plan was developed in 1990 and was updated in 2015. The Nitrogen Fertilizer Management Plan is available at: www.mda.state.mn.us/nfmp .

The primary goal of the NFMP is to involve local farmers and crop advisers in problem-solving to address elevated levels of nitrate in groundwater. As part of the NFMP, the MDA designed the Township Testing Program (TTP) to assess nitrate-nitrogen concentrations in private wells within areas that are vulnerable to groundwater contamination (See vulnerable area map below).



This image shows the Zumbro watershed on the Pollution Sensitivity of Near-Surface Material. The Karst and High ratings indicate areas where nitrate can move easily into groundwater.

Township Testing Program (TTP)

The MDA has identified townships throughout the state that are vulnerable to groundwater contamination and have significant row crop production. Within the Zumbro River Watershed, the MDA has sampled private wells within all four counties. The sampling includes a first round of sampling when all homeowners within the township are offered a test kit, and a second round when trained MDA staff resample and evaluate the location and conditions of wells where nitrate-nitrogen was detected.

- Dodge County and Olmsted County have been through both the initial testing and the follow-up testing.
- Wabasha and Goodhue have been through the initial testing and are close to having the follow-up testing and evaluation completed.

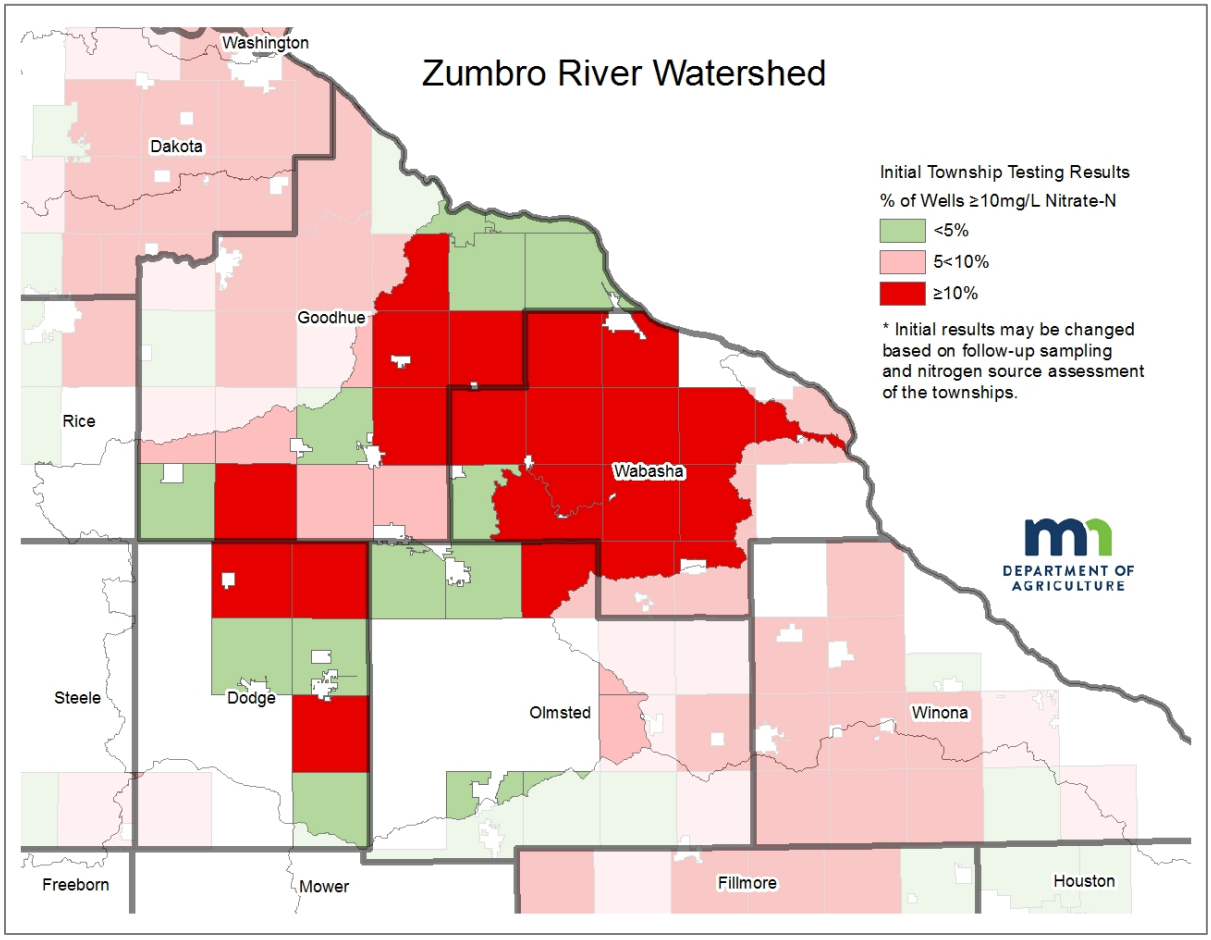
Initial Township Testing Results

County	Number of Townships Tested	Number of Wells	Number of Townships with Wells at or Over the Health Risk Limit (10 mg/L Nitrate-N)					
			<5%	5-9%	10-19%	20-29%	30-39%	>40%
Dodge	7	654	3	1	3	0	0	0
Goodhue	22	2071	7	6	6	2	1	0
Olmsted	11	1057	5	4	1	1	0	0
Wabasha	14	1087	1	0	8	4	1	0

Final Township Testing Results

County	Number of Townships Tested	Final Well Dataset	Number of Townships with Wells at or Over the Health Risk Limit (10 mg/L Nitrate-N)					
			<5%	5-9%	10-19%	20-29%	30-39%	>40%
Dodge	7	588	7	0	0	0	0	0
Olmsted	11	923	10	0	1	0	0	0

Two datasets, “Initial” and “Final”, are used to evaluate nitrate in private wells. The initial dataset represents private well drinking water regardless of the potential source of nitrate. The final database was formed through an assessment process to evaluate wells. In the assessment, wells that had nitrate-nitrogen results over 5 mg/L were removed from the initial dataset to form the final dataset if a potential non-fertilizer source or well problem was identified, there was insufficient information on the construction or condition of the well, or for other reasons which are outlined in the full report for each county (see Appendix E for details). The final dataset represents wells with nitrate attributed to the use of fertilizer. Nitrate concentrations within the townships tested ranged from <0.05 to 22 mg/L. **Detailed sampling results and county reports are available at: www.mda.state.mn.us/townshiptesting**



This map displays the initial Township Testing Program results. Initial results represent private well drinking water regardless of nitrate source.

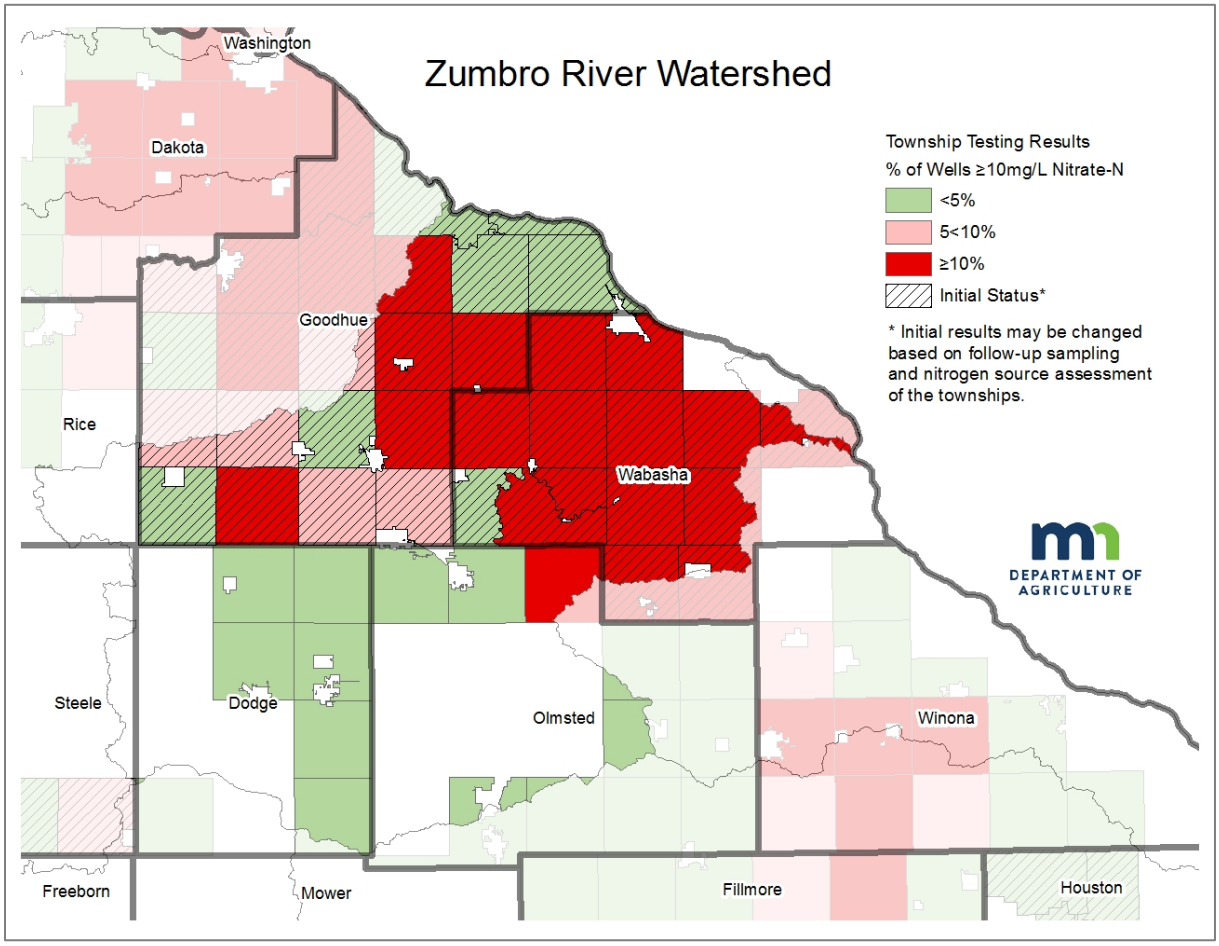


Figure 1 This map displays results from the Township Testing Program, including final results. Townships with hash lines represent initial testing results and townships without hash lines are final.

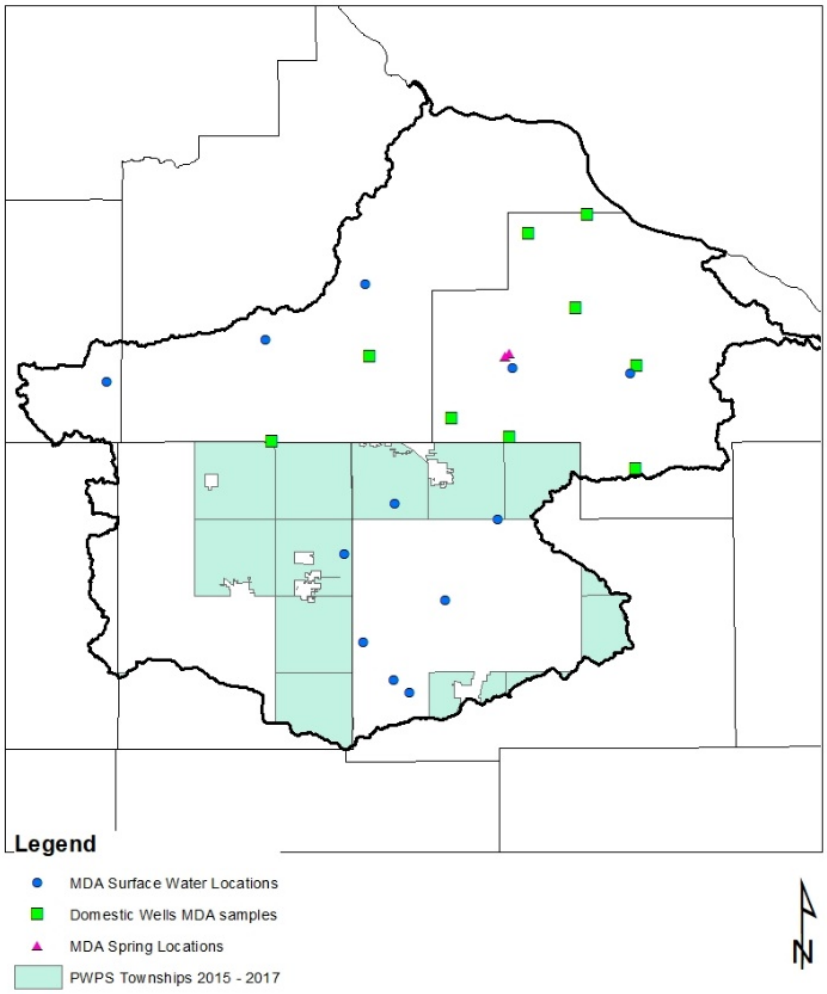
Private Well Pesticide Sampling (PWPS)

The MDA began evaluating pesticide presence and magnitude in private residential drinking water wells as part of the Private Well Pesticide Sampling (PWPS) Project in 2014. This is a companion program to the MDA Township Testing Program (TTP). Townships in different counties have been, and will continue to be, sampled every year until the project concludes in 2020. The townships included in the PWPS depend on the voluntary participation of well owners and may not reflect all of the townships sampled in the TTP.

- As part of the PWPS Project, wells in 14 townships in Dodge and Olmstead Counties were sampled. The sampling occurred in 2015 in Olmstead County and 2017 in Dodge County. The chemistry data is available for the wells; however due to privacy rules, the well locations can't be shared.
- Twenty-three pesticides or pesticide degradates were detected in wells in these two townships. None exceeded human health reference values.
- Note that in 2015, the laboratory analyzed for 22 compounds. In 2016, a new laboratory was selected and could analyze for approximately 125 compounds. Samples from Dodge County were analyzed for this larger number of compounds.

More information is available at: www.mda.state.mn.us/pwps

MDA Sample Locations in the Zumbro River Watershed
(Ambient Monitoring and PWPS Townships)



Pesticide Water Quality Monitoring

The MDA has been conducting pesticide monitoring in groundwater since 1985, and in surface waters since 1991. Annually, the MDA completes approximately 250 sample collection events from groundwater and 800 sample collection events from rivers, streams, and lakes across the state. In general, the MDA collects water samples from agriculture and urban areas of Minnesota and analyzes water for up to approximately 150 different pesticide compounds that are widely used and/or pose the greatest risk to water resources. Groundwater monitoring is conducted by the MDA and Minnesota Pollution Control Agency staff. Surface water monitoring is conducted by the MDA and local organizations. All monitoring is completed following annual work plans and standard operating procedures (SOP's) developed by the MDA.

Groundwater Monitoring Wells

- Within the Zumbro River Watershed, the MDA sampled ten sites. One of the sites is a spring and the other nine sites are domestic wells. Samples have been collected at two locations associated with the spring (Cold Spring North and Cold Spring South) since 2006. The spring is sampled twice a year, in June and August. Domestic wells are used for monitoring in southeastern Minnesota because of the high cost of installing monitoring wells into the upper most aquifer in the area.

Domestic well monitoring in the watershed began in 2009. The chemistry data is available for the wells however, due to privacy rules, the well locations can't be shared.

- Twenty different pesticides or pesticide breakdown products (or degradates) have been detected in the wells and the spring. None have exceeded human health reference values. Nitrate-nitrite (nitrate) has been detected in the wells and the spring. The nitrate concentrations range from 3.05 to 26.1 mg/L, exceeding the health risk limit for nitrate (10 mg/L) in many samples. Monitoring of the MDA's wells in the watershed is expected to continue into the future.

Surface Water Monitoring

- The MDA has completed 209 pesticide water quality sample collection events from 12 river and stream locations from 1991-2017. There are currently no pesticide water quality impairments in the watershed.
- The MDA has been actively monitoring the North Fork Zumbro River at CSAH-30, one mile northwest of Wanamingo (S004-383) since 2010. The MDA will collect pesticide water quality samples until at least 2023.

The purpose of the MDA's pesticide monitoring program is to determine the presence and concentration of pesticides in Minnesota waters, and present long-term trend analysis. Trend analysis requires a long-term investment in monitoring within the MDA's established networks. The MDA releases an annual water quality monitoring report that includes all pesticide water quality data and long term trends is available at www.mda.state.mn.us/monitoring. MDA's surface and groundwater water quality data is also available at the National Water Quality Monitoring Council: https://www.waterqualitydata.us/

Southeast Minnesota Volunteer Nitrate Monitoring Network

In 2006, nine southeast Minnesota counties coordinated planning to develop a Volunteer Nitrate Monitoring Network (VNMN) to monitor long term trends of nitrate concentrations in private drinking water wells throughout southeastern Minnesota. From 2006 until 2012 the Project team included nine southeastern Minnesota counties and multiple state agencies funded by the EPA 319 Program and the MPCA Clean Water Partnership (CWP) Program. The first two years of the project were primarily the planning stage, the first round of samples were collected in 2008. In 2013, the program was changed to incorporate more analytes in selected wells, but was no longer sampling the entire network for nitrate. In 2014, the Minnesota Department of Agriculture coordinated with the County Water Planners and Southeast Minnesota Water Resources Board (SEMNWRB) to continue sampling all of the wells in the network on an annual basis to determine long term trends and keep the original network intact where possible.

Home owners are the cornerstone of this network, this work could not be done without them. Network participants are sent a nitrate test kit directly to their home on an annual basis by the lab. The homeowner simply fills up the bottle and sends it directly back to the lab for analysis. The lab then sends homeowners their results.

In 2017, 341 private drinking water wells were sampled for nitrate. A summary of results:

- 68.9% were < 3 mg/L
- 21.1% were 3<10 mg/L
- 10.0% were ≥10 mg/L

More information is available at: https://www.mda.state.mn.us/southeast-minnesota-volunteer-nitate-monitoring-network

Discovery Farm: Edge of field Monitoring

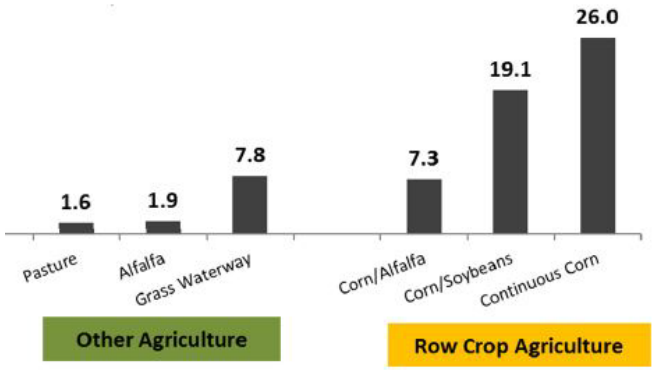
Edge of field monitoring is important for relating farm practices and weather conditions to offsite movement of nutrients, sediments and pesticides. There is one Discovery Farm site within the Zumbro River watershed: DO1 (Dodge County). The site is located on the till plain portion of the watershed and has six years of data (WY2013 – WY2018). The MDA monitors nitrogen and phosphorus (P) in both surface runoff and subsurface tile losses and the information is summarized in the two tables below (Six-year average):

Subsurface tile loss	Runoff (inches)	Total Suspended Solids (lbs/ac)	Total Phosphorus (lbs/ac)	Total Nitrogen (lbs/ac)
Average	5.91	8.0	<0.1	35.3
Range	1.70 – 9.75	1.4 – 22.3	<0.1 – 0.1	9.9 – 60.1
% loss during Frozen Soils	11 %	32 %	25 %	11 %

Surface loss	Runoff (inches)	Total Suspended Solids (lbs/ac)	Total Phosphorus (lbs/ac)	Total Nitrogen (lbs/ac)
Average	1.49	140.3	0.5	2.5
Range	0.10 – 3.99	1.2 – 260.6	<0.1 -1.6	0.2 – 7.9
% loss during Frozen Soils	84 %	21 %	75 %	73 %

Southeast Minnesota Soil Water Nitrate-Nitrogen Concentrations

In a collaborative project, soil water nitrate concentrations below the root zone was measured under different cropping systems to assess the impact of land cover on water quality. The result of this five-year project conducted in southeaster Minnesota (including Wabasha and Dodge counties) between 2011 and 2015 are summarized in the figure below (a total of 1929 lysimeter samples). More information is available upon request.



Nitrogen and Pesticide Use Surveys

The MDA surveys farmers through the National Agricultural Statistics Service (NASS) on practices related to crops and farm inputs. The most recent nitrogen use survey was for the 2014 crop year, while the most recent pesticide use survey was from the 2013 crop year. The two tables below provide insights into nitrogen rates by rotation in this watershed, and more information is available at: https://www.mda.state.mn.us/pesticide-and-fertilizer-use-surveys

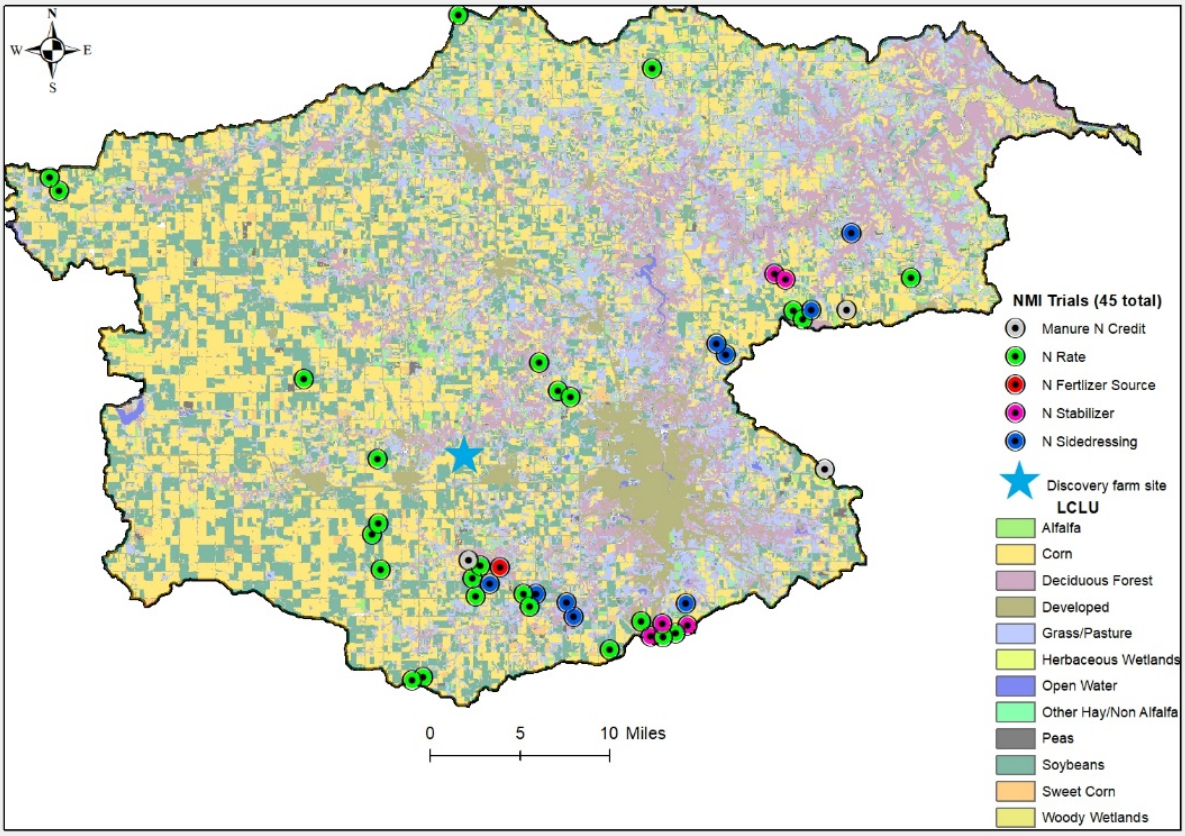
Average County Nitrogen Fertilizer Rates for Corn Following Soybeans			
County	**Number of Farm Fields**	**Average Nitrogen Rate Pounds per Acre**	**Average Corn Yield Bushels per Acre**
Goodhue	31	148	182
Olmsted	15	145	175
Wabasha	15	143	168

Average County Nitrogen Fertilizer Rates for Corn Following Corn			
County	**Number of Farm Fields**	**Average Nitrogen Rate Pounds per Acre**	**Average Corn Yield Bushels per Acre**
Goodhue	19	165	179
Olmsted	8	169	184
Wabasha	11	151	172

For reference, the University of Minnesota nutrient management recommendations for agronomic crops grow in MN can be found here: https://extension.umn.edu/nutrient-management/crop-specific-needs

Nutrient Management Initiative (NMI)

The NMI program assists crop advisers and farmers in evaluating nutrient management practices on their own fields through the use of on-farm trials. This is a great opportunity to promote new strategies that could improve fertilizer use efficiency, as well as to help open the door to include local farmers and crop advisers in the water quality discussion. Since the beginning of the NMI program, there have been approximately 45 on-farm trials established in the Zumbro watershed (see map below). Across the state NMI trials have included cover crops, fertilizer rate, placement, and timing, as well as precision agriculture and technology. Through this program crop advisors work directly with farmers and focus on new management strategies within the farmer's field. The trials in this watershed have focused on nitrogen application rates and timing (split application) on corn following soybeans. More advanced trials in this program are coordinated with University of Minnesota researchers and have been used to help guide corn nitrogen rate recommendations for this region of the state. More information on this program is available at: www.mda.state.mn.us/nmi



Minnesota Agricultural Water Quality Certification Program (MAWQCP)
The MAWQCP is a voluntary opportunity for farmers and agricultural landowners to take the lead in implementing conservation practices that protect water quality. Participants that implement and maintain approved farm management practices will be certified and in turn obtain regulatory certainty for a period of ten years. This is a planning program that should be included in the 1W1P because it is an opportunity for agricultural producers to evaluate nutrient and field management practices within the watershed to help reduce losses.

There are currently 68 certified farmers in the Zumbro River watershed, covering 384 parcels and 36,291 acres. Additional information on the MAWQCP is available at: www.mda.state.mn.us/awqcp.

Additional Resources and Opportunities for BMP funding and Cost-Share

Minnesota Agricultural BMP Handbook (revised in 2018)
The MDA recently supported an update to this handbook initially created in 2012. This handbook provides a comprehensive summary of BMPs that are practical for Minnesota. The handbook incorporates the most current data to create realistic estimates of the benefits of best management practice implementation. Estimates of effectiveness, economic consideration and other potential barriers are included with each BMP description in this handbook. This resource may be especially useful reference for outreach and implementation planning efforts in the agricultural portions of the Zumbro River watershed. This handbook is available at: www.mda.state.mn.us/agbmphandbook

Agricultural Land Preservation Program
The MDA assists local government in protection of farmland through its Agricultural Land Preservation Program. This includes online tools and programmatic support. More information is available at https://www.mda.state.mn.us/environment-sustainability/farmland-protection

Agricultural Growth, Research, and Innovation (AGRI) Program
The AGRI program has funding that may be helpful in water quality protection. Specifically:

- The AGRI **Livestock Investment Grant** encourages long-term industry development for Minnesota livestock farmers and ranchers by helping them improve, update, and modernize their livestock operation infrastructure and equipment. More information is available at www.mda.state.mn.us/livestockinvestment.

- The AGRI **Sustainable Agriculture Demonstration Grant** supports innovative on-farm research and demonstrations. It funds projects that explore sustainable agriculture practices and systems that could make farming more profitable, resource efficient, and personally satisfying. Findings are published in the MDA's annual *Greenbook*. More information is available at www.mda.state.mn.us/sustagdemogrant.

The AgBMP Loan Program: www.mda.state.mn.us/agbmploans
The AgBMP Loan Program is a water quality program that provides low interest loans to farmers, rural landowners, and agriculture supply businesses. The purpose is to encourage agricultural best management practices that prevent or reduce runoff from feedlots, farm fields, and other pollution problems identified by the county in local water plans. In addition, these loans are available to help finance repairs, replacement wells, or water treatment equipment to provide safe drinking water to rural residents who have water quality issues.

Additional Suggestions:

- Agricultural BMPs placement is very important. Apply the Agricultural Conservation Planning Framework (ACPF) developed by the USDA-Agricultural Research Service to help facilitate an advanced level of conservation planning, targeting and delivery.
- ACPF can be used in conjunction with $PTMA_{pp}$ to quantify Ag BMPs load reduction potential and the cost effectiveness of the BMPs.
- Implement a coordinated approach to address both nutrients in groundwater and surface water especially in the eastern part of this watershed where ground water and surface water interrelated.

Thank you again for the opportunity to provide background and relevant information. We look forward to being involved in the 1W1P process.

Sincerely,

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