DEPARTMENT OF AGRICULTURE

Minnesota's 2024 Water Testing Clinics for Nitrate Summary

Minnesota Department of Agriculture

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CLEAN WATER LAND & LEGACY AMENDMENT

Minnesota Water Testing Clinics for Nitrate Summary Report – 2024

Nitrate is one of the most common contaminants in Minnesota's groundwater. The majority of Minnesota households have access to safe drinking water supplies. However, in areas vulnerable to groundwater contamination, some public and private wells have nitrate levels that exceed the health risk limit for nitrate. While elevated levels of nitrate in groundwater can result from several factors, a major contributor in rural Minnesota is nitrogen fertilizer that leaches past the crop root zone.

Nitrate in Groundwater

The health risk limit for nitrate in drinking water is 10 mg/L, according to the U.S. Environmental Protection Agency (EPA) and the Minnesota Department of Health. The reference of 10 mg/L of nitrate is the same as 10 parts per million. Through local partners such as SWCDs and County Environmental Services, the Minnesota Department of Agriculture (MDA) offers water testing clinics to test for nitrate and increase public awareness of nitrate contamination in rural drinking water. The MDA has purchased spectrophotometers that use ultraviolet light to measure nitrate in water. A spectrophotometer is an instrument used to measure the amount of light absorbed by a sample at different wavelengths, providing information about the sample's composition. The MDA uses the spectrophotometer specifically to measure the nitrate concentration of the sample. This process takes only a few minutes per sample. The MDA loans these machines to local partners across Minnesota as a public service to provide private well owners a screening tool to evaluate nitrate concentrations in the well water.

In 1993, the MDA developed an onsite, walk-in style water testing clinic with the objective of increasing public awareness of nitrate levels in private well water. The program was successful in achieving high monitoring rates in counties that have a chronic problem with nitrate concentrations greater than 10 mg/L. The program was funded through the Environment and Natural Resources Trust Fund and other grants between 1999 and 2006. This funding ended in 2006, and the program was discontinued. Counties were still able to use the MDA nitrate testing equipment but had to provide their own personnel to run the clinic and record the nitrate analysis results. The Water Testing Clinic Program was reinstated in 2011 with help of Clean Water Funds and continues to be funded through those dollars.

The Minnesota Department of Agriculture currently sponsors spectrophotometers to any entity in Minnesota that would like to host a water testing clinic.

Locations of Water Testing Clinics for Nitrate in 2024

The MDA collaborates with local partners to conduct water testing clinics for private well owners across the state of Minnesota. Clinics are held primarily in areas vulnerable to groundwater contamination and in areas with a high percentage of agricultural land. Elevated levels of nitrate in groundwater can result from several factors, a major contributor in rural Minnesota is nitrogen fertilizer or manure that leaches past the crop root zone. Water testing clinics were held across the 18 counties that are displayed in Figure 1.

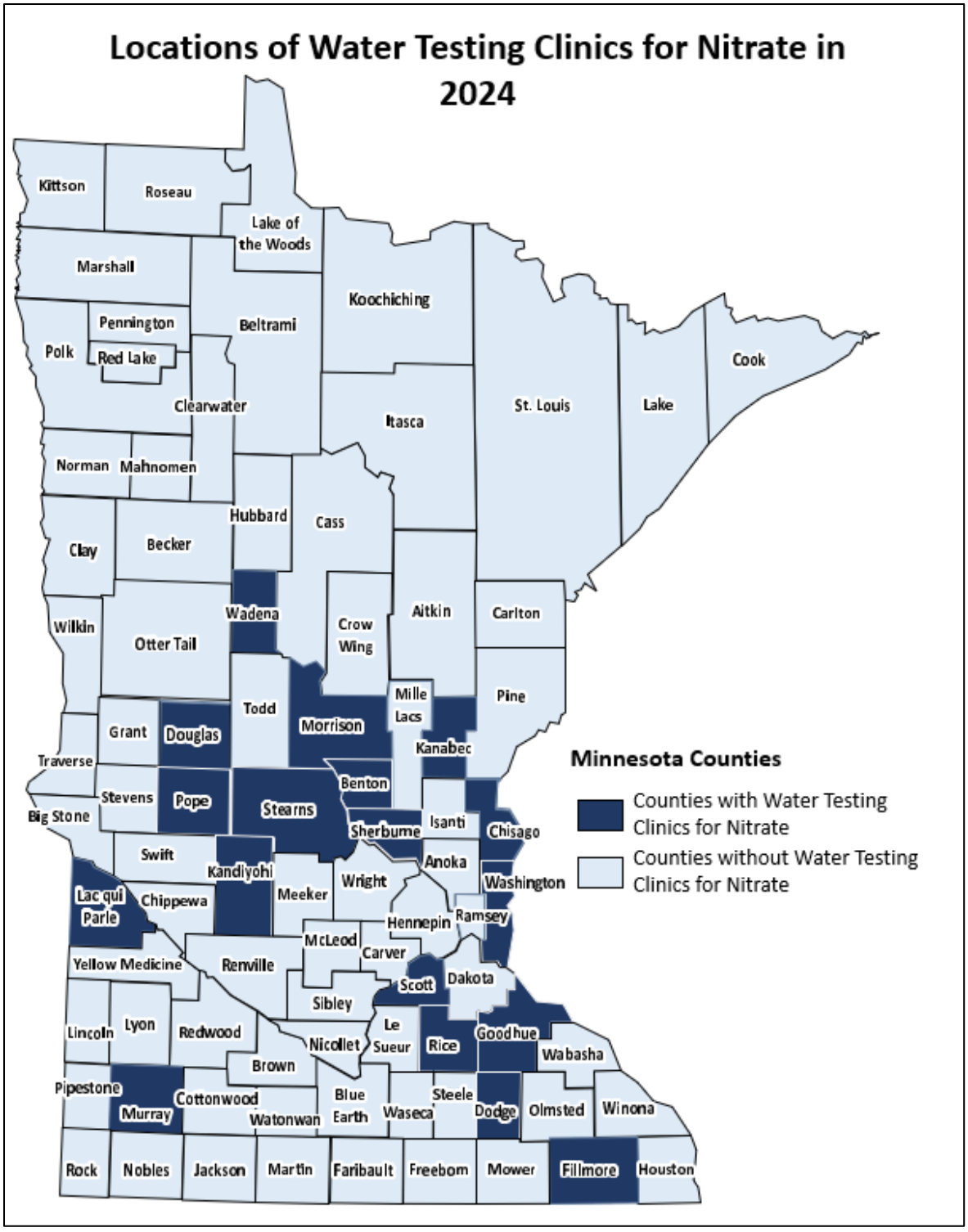

Figure 1. Location of the 18 water testing clinic 2024

The total number of water samples tested in individual counties across Minnesota are displayed in Figure 2. There were 2,437 water samples tested in 2024.

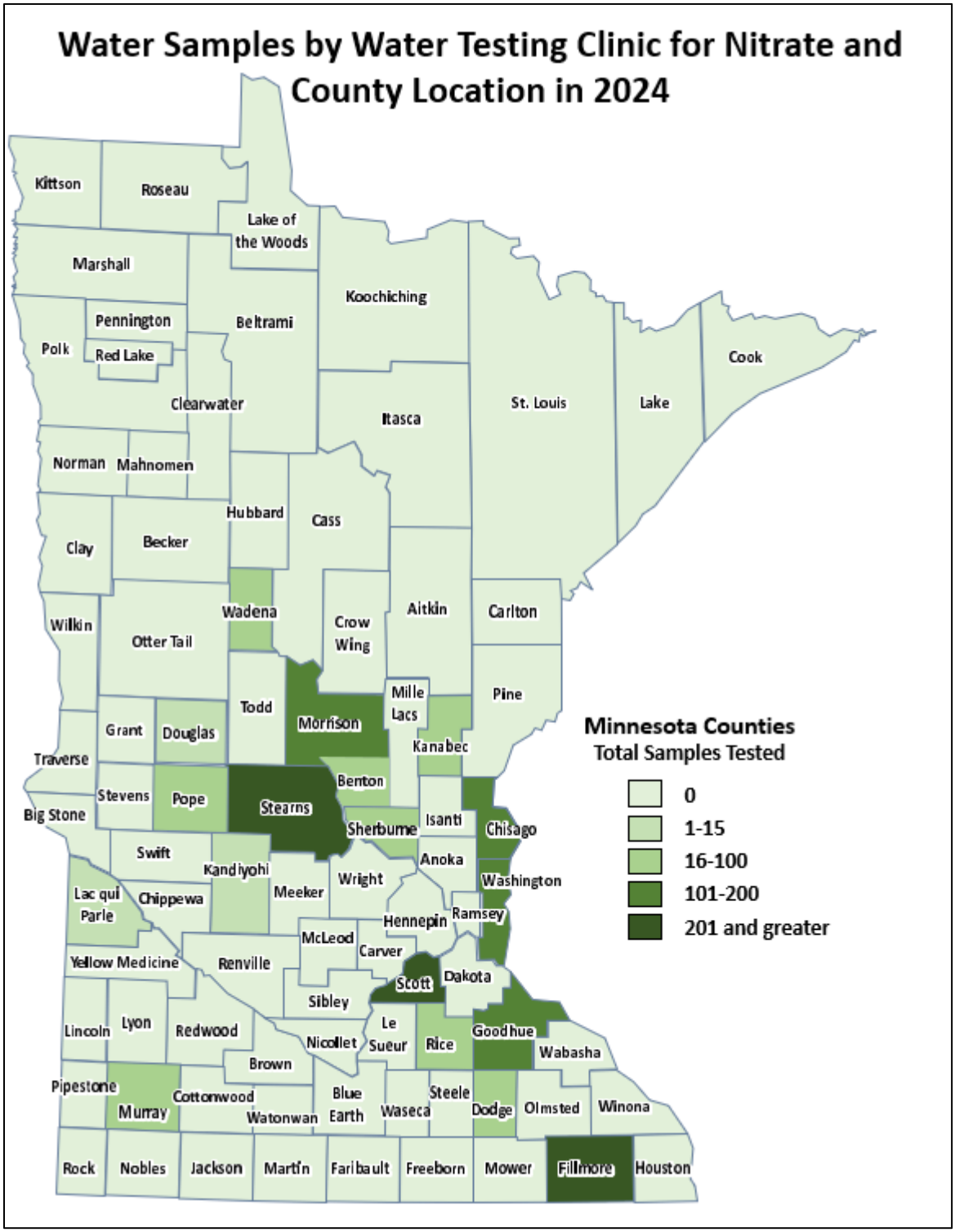

Figure 2. Total water samples by county in 2024

Water Sample Testing Results by Water Partner

Overall, 2,437 water samples for nitrate were reported in 2024 in Minnesota. Partners varied in the number of water samples tested and their results. There were 14 primary partners and 11 secondary partners listed for a total of 25 partners who conducted water testing clinics for nitrate in 2024 as shown in Figure 3. Water testing clinics with two partners, list the primary water partner first and secondary water partner last. There were 144 samples that were above the health risk limit of 10 mg/L. Eight of the water testing clinics were held by two or more partners and they are listed by separately in Figure 3. The Minnesota Well Owners Organization (MNWOO) and Minnesota Ground Water Association (MGWA) have partnered together with their water sample testing and accounted for 1,186 samples (49%) in multiple water clinics. MNWOO/MWGA had multiple partners with the Land Stewardship Project water clinic. A complete list is provided in Table 1 on Page 9. Individual names are not published in this report.

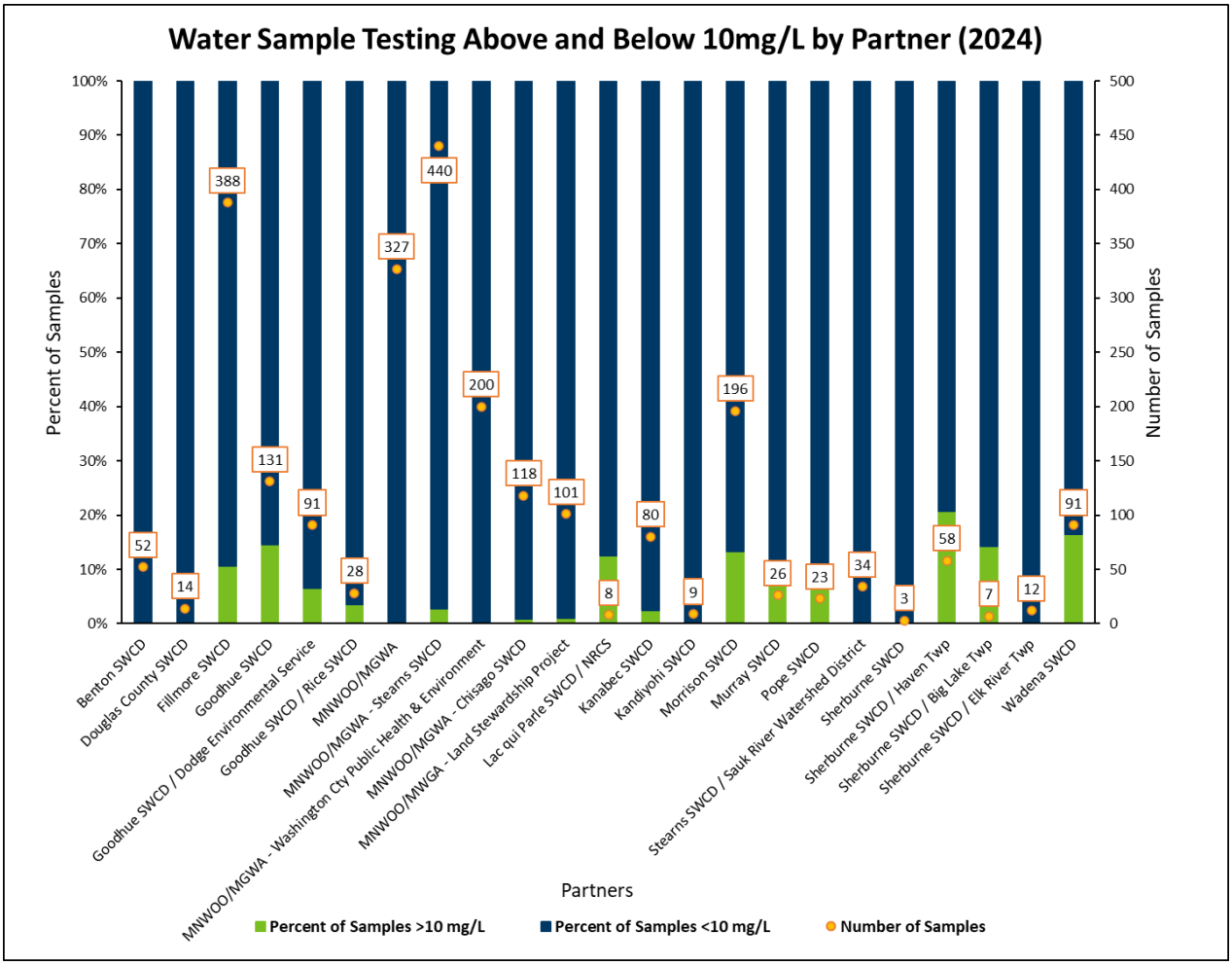

Figure 3. Water sample testing for nitrate by partner (2024)

Water Sample Testing for Nitrate by County in Minnesota

Water samples from 18 Minnesota counties were tested for nitrate as shown in Figure 4. Water samples by county ranged from eight per county to 489 per county.

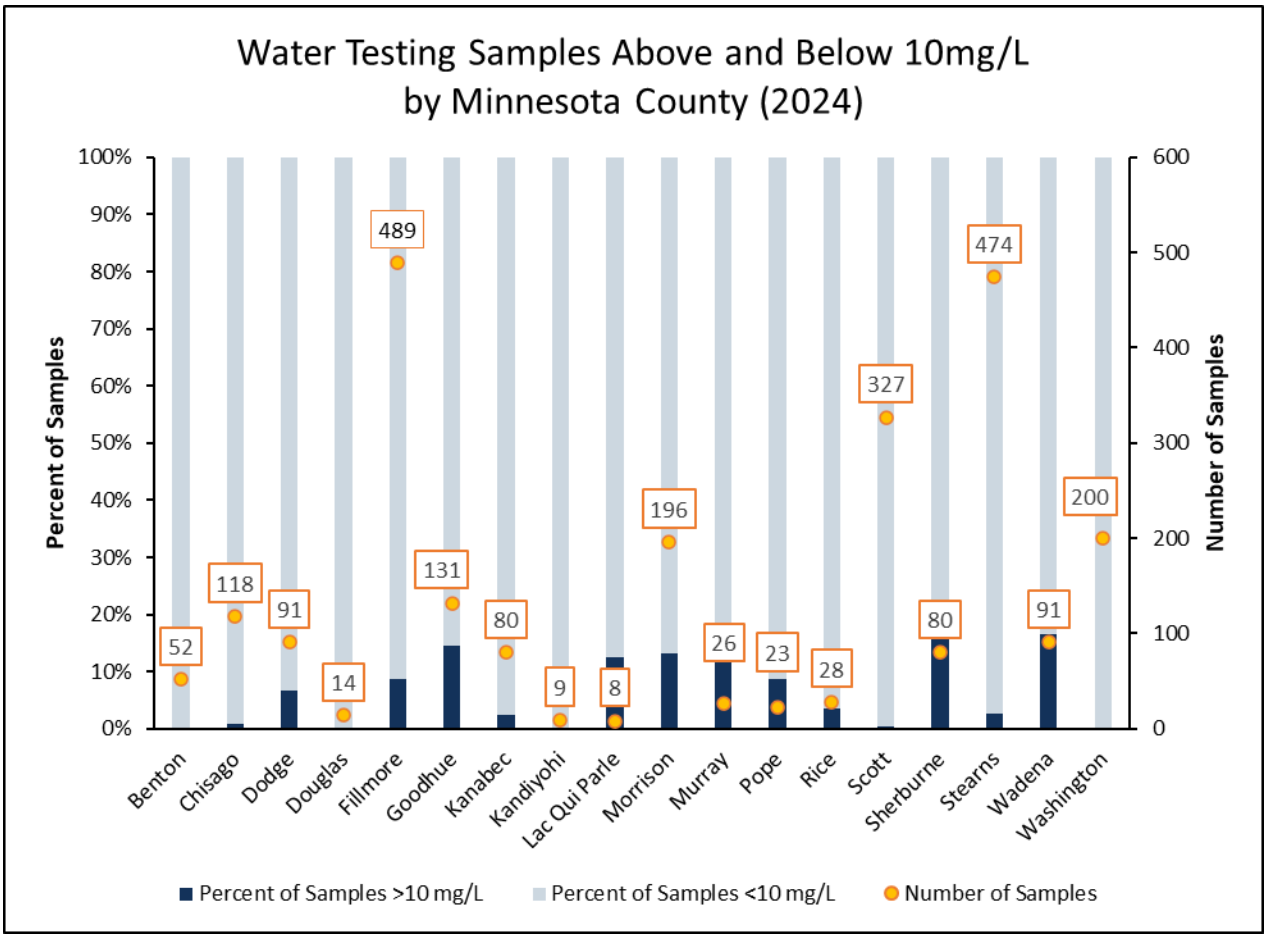

Figure 4. Water sample testing for nitrate by county (2024)

- Across all counties, 6% (144) of 2,437 water samples exceeded the drinking water standard for nitrate (>10 mg/L).
    - Six counties had more than 10% of water samples over 10 mg/L nitrate
    - Three counties had between 5% and 9% of water samples over 10 mg/L nitrate
    - Nine counties had less than 5% of water samples over 10 mg/L nitrate

Minnesota BMP Regions

Minnesota's Best Management Practice (BMP) Regions for nitrogen are displayed below in Figure 5. Each region has unique properties that can affect nitrogen use for crops and corresponding nitrate leaching.

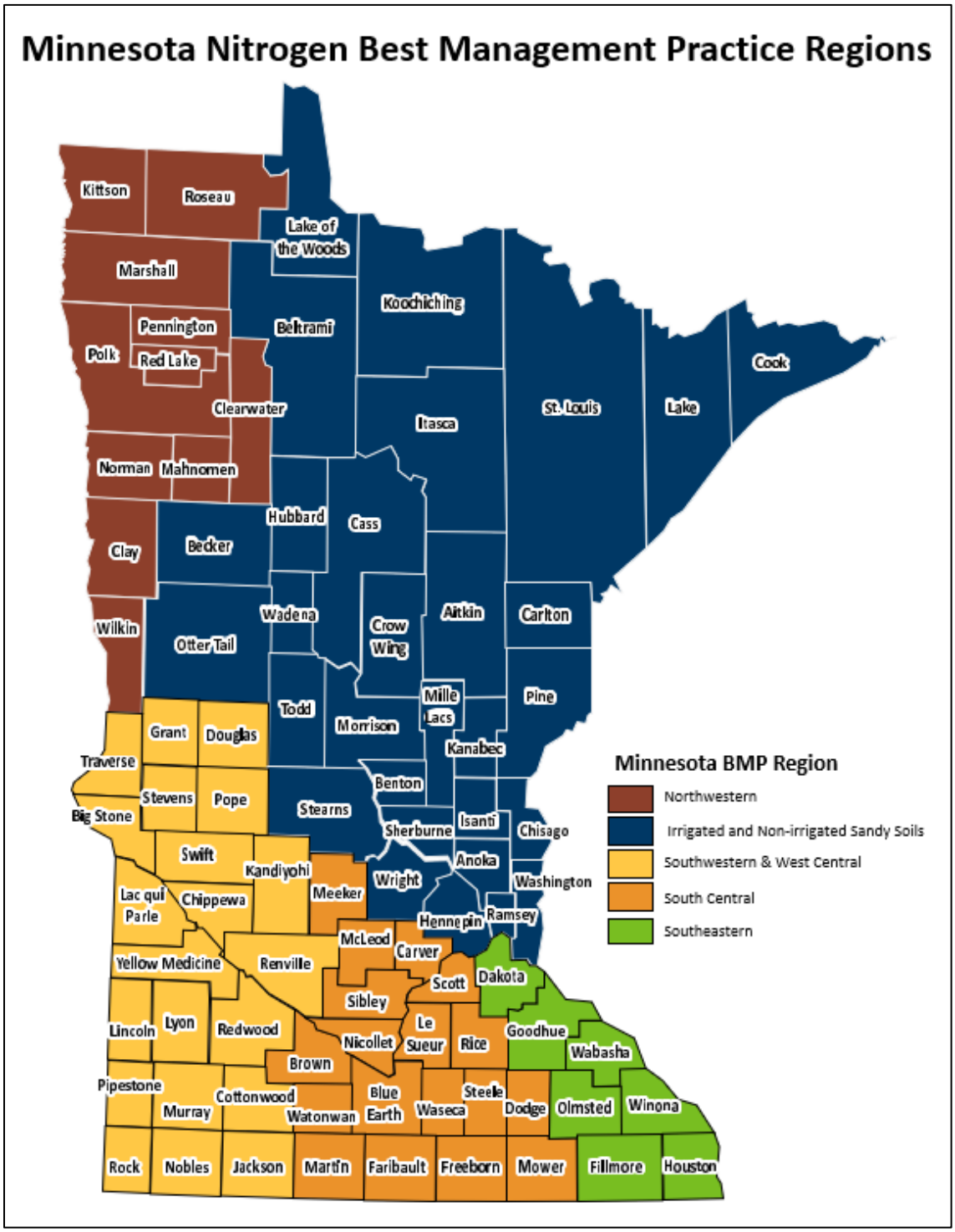

Figure 5. Minnesota Nitrogen BMP Regions (2024)

Water Sample Testing for Nitrate by Minnesota Nitrogen BMP Region

Water testing clinics were held in four of five Minnesota Nitrogen BMP Regions in 2024. Figure 6 details the number of samples by region and percent of samples for each region that had private well water results over 10mg/L for all 2,437 samples. Sandy soils and soils with karst geology tend to be located in the Irrigated and Non-Irrigated Sandy Soils BMP and Southeastern BMP regions of Minnesota.

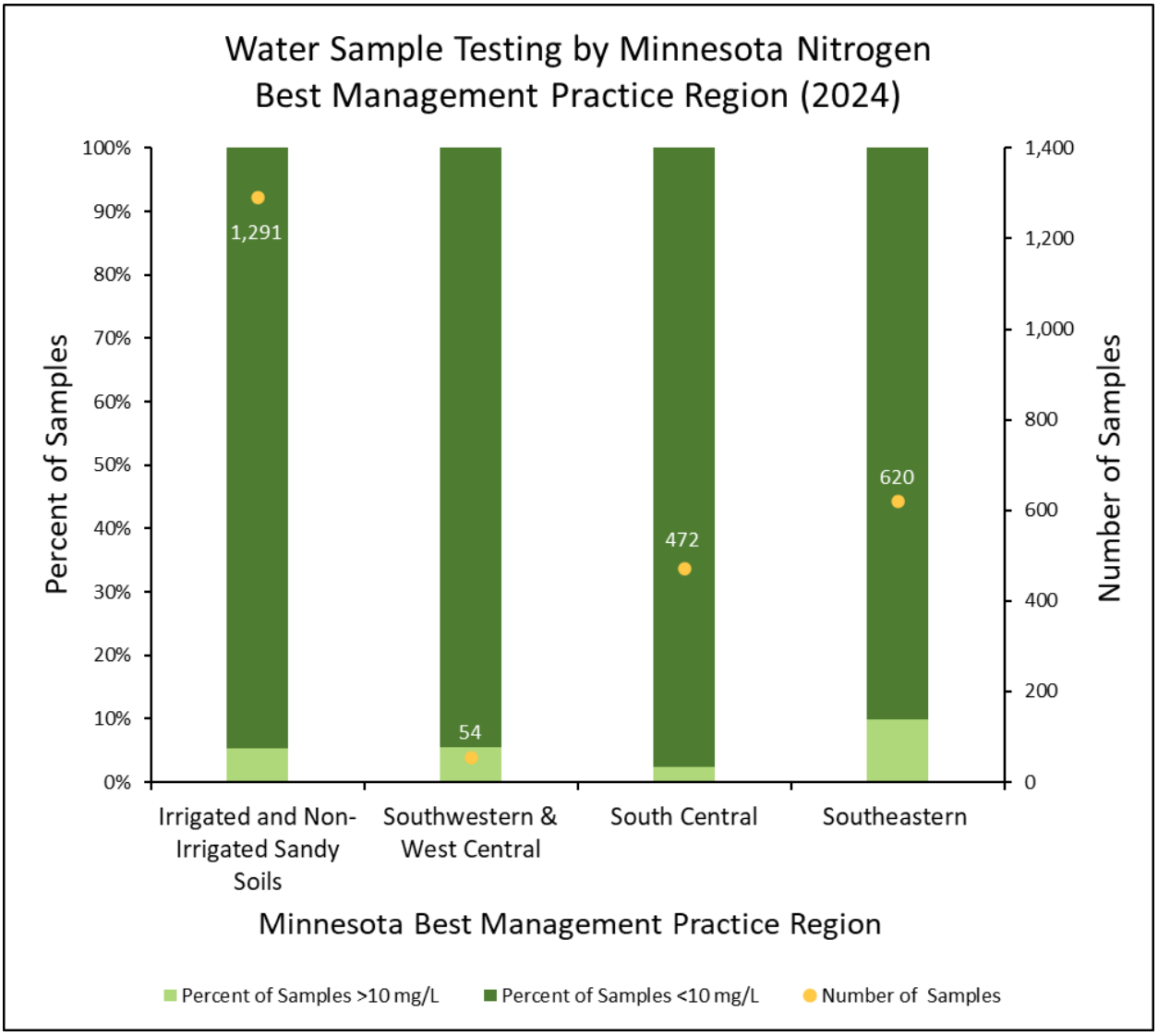

Figure 6. Water sample testing for nitrate by Nitrogen BMP Regions (2024)

Water testing clinics for nitrate were held in 18 counties across four Minnesota Nitrogen BMP Regions.

- Statewide, 2,437 water samples were tested. There were 144 (6%) water samples that were above 10 mg/L for nitrate.
- The Irrigated and Non-Irrigated Sandy Soils BMP Region had 1,291 water samples tested. There were 69 (6%) water samples that were over 10 mg/L of nitrate.

- The Southwestern and West Central BMP Region had 54 water samples tested. There were 3 (6%) water samples that were over 10 mg/L of nitrate.
- The South Central BMP Region had 461 water samples tested. There were 11 (2%) water samples that were over 10 mg/L of nitrate.
- The Southeastern BMP region had 620 water samples tested. There were 61 (10%) water samples that were over 10 mg/L of nitrate.
- The Northwestern BMP region did not host water testing clinics for nitrate.

Results and Explanations

Participants had their water tested and then were provided and explanation of the results by one of the partners who sponsored the clinic. The explanation was generally provided by someone with some expertise in ground water who could help the participant in understanding where the nitrate could be coming from if there were any in the sample. This is though discussion of the location of the well, age of the well, depth of the well, and other factors that could affect nitrate concentrations.
The explanation of the results was followed by potential remediation of the nitrate in the water, again dependent on the level of nitrate such as using reverse osmosis, distillation, alternative water supplies or even if a new well would be an option. A list of certified laboratories was also provided, and suggested to use, if the nitrate was above or near the health standard.

Conclusions

There were 2,437 water samples tested in Minnesota by MDA's water partners in 2024. Of those 2,437 water samples, 144 samples (6%) were above the health risk limit of 10 mg/L. There were 14 primary partners and 11 secondary partners for a total of 25 water partners who conducted water testing clinics for nitrate in 2024. Eighteen counties had water sample clinics for nitrate ranging from 8 samples in Lac Qui Parle County to 489 samples in Fillmore County. Water clinics were held in 4 of Minnesota's nitrogen BMP regions and the Southeastern BMP Region had the highest percent of water samples over 10 mg/L at 10%. Remediation and recommendations to address nitrate in the well water was also provided with the results.

Appendix

There were 2,437 water samples tested for nitrate. Table 1 reflects the water testing results by partner in Figure 3 on page 4.

Table 1. Water sample testing for nitrate by partner (2024)

Water Testing Partner	Number of Water Samples	Percent of Water Samples >10mg/L	Percent of Water Samples <10mg/L
Benton SWCD	52	0%	100%
Douglas County SWCD	14	0%	100%
Fillmore SWCD	388	11%	89%
Goodhue SWCD	131	15%	85%
Goodhue SWCD / Dodge Environmental Service	91	7%	93%
Goodhue SWCD / Rice SWCD	28	4%	96%
MNWOO/MGWA	327	0%	100%
MNWOO/MGWA - Stearns SWCD	440	3%	97%
MNWOO/MGWA - Washington County Public Health & Environment	200	0%	100%
MNWOO/MGWA - Chisago SWCD	118	1%	99%
MNWOO/MWGA - Land Stewardship Project, Hiawatha Trout Unlimited, Responsible Ag in Karst County, Winona Water Quality Coalition	101	1%	99%
Lac qui Parle SWCD / NRCS	8	13%	87%
Kanabec SWCD	80	3%	97%
Kandiyohi SWCD	9	0%	100%
Morrison SWCD	196	13%	87%
Murray SWCD	26	12%	88%
Pope SWCD	23	9%	91%
Stearns SWCD / Sauk River Watershed District	34	0%	100%
Sherburne SWCD	3	0%	100%
Sherburne SWCD / Haven Twp	58	21%	79%
Sherburne SWCD / Big Lake Twp	7	14%	86%
Sherburne SWCD / Elk River Twp	12	0%	100%
Wadena SWCD	91	16%	84%
Total	**2,437**	**6%**	**94%**

Water samples from 18 Minnesota counties were tested for nitrate in 2024. Only counties with water testing clinics are listed in Table 2. Table 2 reflects the water testing results by county in Figure 4 on page 5.

Table 2. Water sample testing for nitrate by county (2024)

County	Number of Water Samples	Percent of Water Samples >10mg/L	Percent of Water Samples <10mg/L
Benton	52	0%	100%
Chisago	118	1%	99%
Dodge	91	7%	93%
Douglas	14	0%	100%
Fillmore	489	9%	91%
Goodhue	131	15%	85%
Kanabec	80	3%	98%
Kandiyohi	9	0%	100%
Lac Qui Parle	8	13%	88%
Morrison	196	13%	87%
Murray	26	12%	88%
Pope	23	9%	91%
Rice	28	4%	96%
Scott	327	0%	100%
Sherburne	80	16%	84%
Stearns	474	3%	97%
Wadena	91	16%	84%
Washington	200	0%	100%
Total	**2,437**	**6%**	**94%**

Water testing clinics were held in four of five Minnesota Nitrogen BMP Regions in 2024. The Northwest Region had no water testing clinics and is not listed in Table 3. Table 3 reflects the water testing results by Minnesota Nitrogen BMP Region in Figure 6 on page 7.

Table 3. Water sample testing for nitrate by Nitrogen BMP Region (2024)

Nitrogen BMP Region	Number of Water Samples	Percent of Water Samples >10mg/L	Percent of Water Samples <10mg/L
Irrigated and Non-Irrigated Sandy Soils	1,291	5%	95%
Southwestern & West Central	54	6%	94%
South Central	472	2%	98%
Southeastern	620	10%	90%
Statewide	**2,437**	**6%**	**94%**