

PHASE II & III NEWSLETTER



New Program Announced: Chemigation Cost-Share

The district is looking for ways to incentivize producers who try fertilizer application using chemigation as a means of increasing adoption of this practice. Chemigation is a useful way to apply chemicals and fertilizer onto fields using a center pivot to control application uniformity. All that is necessary to chemigate is an applicators license, the appropriate safety equipment, and a permit from the NRD (see page 2). The goal of this incentive program is to increase the number of producers using this fertilizer application method by giving cost-share to producers to help offset the startup cost.

Starting in January 2023, the NRD will offer an incentive program to help producers get started with chemigation. For approved Chemigation Equipment Cost-Share Incentive Program applications, the maximum cost-share rate is 50% of the actual cost, up to \$1,000 per site, for the purchase of new chemigation equipment and chemigation permit.

This program is intended for new chemigation sites and those that have not had an active chemigation permit in the last ten (10) years. The minimum cost-share payment is \$100. NRCS, NSWCP, and NRD funds will not be combined for any practice. Eligible applicants will need to keep their permit active for 3 years. Any equipment purchased prior to application authorization is ineligible for cost-share. Application approval will be based on fund availability. Following approval, producers must provide a receipt for equipment purchased, a copy of their chemigation permit, and any other forms deemed necessary by the district in order to receive cost-share funds.

To see full program details and eligibility guidelines, visit upperbigblue.org/ChemigationIncentive. ♦♦♦

INSIDE THIS ISSUE

- Chemigation Incentive.....1
- Chemigation Permits.....2
- Median Nitrate Values.....3
- Vadose Zone Study.....4
- Cover Crops for Weeds.....5
- Water Use Reporting.....6
- Producer Survey.....6
- Nitrogen Management
Certification Training.....6
- Groundwater Quality Sampling
Schedule..... 7
- Producer Reported Data.....8
- Incentive Program Expanded..9
- Management Area Reqs.....10-11
- Nebraska Soil Carbon
Project.....11
- Water Test Kits.....12





Chemigation: Two Ways to Certify

In recent years, the district has seen an increase in the number of chemigation permits granted as producers are continuing to adopt chemical and fertilizer application through their irrigation systems as a practice to increase their crop yields. Chemigation, sometimes called fertigation, uses a center pivot or subsurface drip irrigation system to apply fertilizer and/or pesticides to growing crops.

Chemigation is an environmentally friendly method to apply fertilizer and pesticide to a growing crop by spoon-feeding the plant's nutrient needs based on the yield goal and growth stage of the crop. It also saves time and labor by not having to go over a field multiple times for equipment applications.

To legally chemigate in Nebraska, a person who applies chemicals through their irrigation system must complete a chemigation safety course and pass a written exam, offered through the University of Nebraska Lincoln and Nebraska Department of Environment and Energy (NDEE). The chemigation certification program serves as an important tool to educate producers about the Nebraska Chemigation Act, chemigation rules and regulations set by the NDEE, and as an overall tool on safe chemical application practices.

It is not only required to obtain certification to chemigate, the NRD also requires an active and

site-specific permit to apply chemicals through an irrigation system. Permit holders for their specific injection site(s) must have at least one up-to-date certified applicator listed, whether it be themselves or any person operating equipment used to apply chemicals through their irrigation system.

The failure to 1) obtain a chemigation permit for each application system and 2) use a certified applicator in all chemigation activities may result in legal enforcement, including the suspension or revocation of a chemigation permit, the revocation of an applicator's certification, civil penalties of up to \$5,000 per day per application site, or criminal penalties under the Nebraska Chemigation Act.

Certification courses are offered online and in-person at multiple locations and dates throughout the state every year. To find out more information about upcoming chemigation training course dates and locations near you, contact our NRD office or your county's UNL Extension office. You can find training materials and links to dates and locations for in-person events at water.unl.edu/article/agricultural-irrigation/chemigation. Training dates for 2023 will be published in December 2022. Online training is available year-round, but it is prudent to wait until January 1 to complete the module to maximize the length of benefit of your certification (certification is good for three years, starting January 1). The online training takes 2-4 hours to complete and includes videos and a 50 question test. New videos are being developed for the online training and are expected to be available in 2023.

Questions? Please call the NRD office at 402-362-6601. ♦♦♦



Nitrates in Groundwater Management Zones Continue Upward Trend

Summer sampling of monitoring wells across the district shows that groundwater nitrate levels continued to increase in some parts of the district over the past year. While no zone has moved into a new phase of management this year, Zone 4 is close to moving into Phase II management and Zone 1 is approaching the threshold to move to Phase III management.

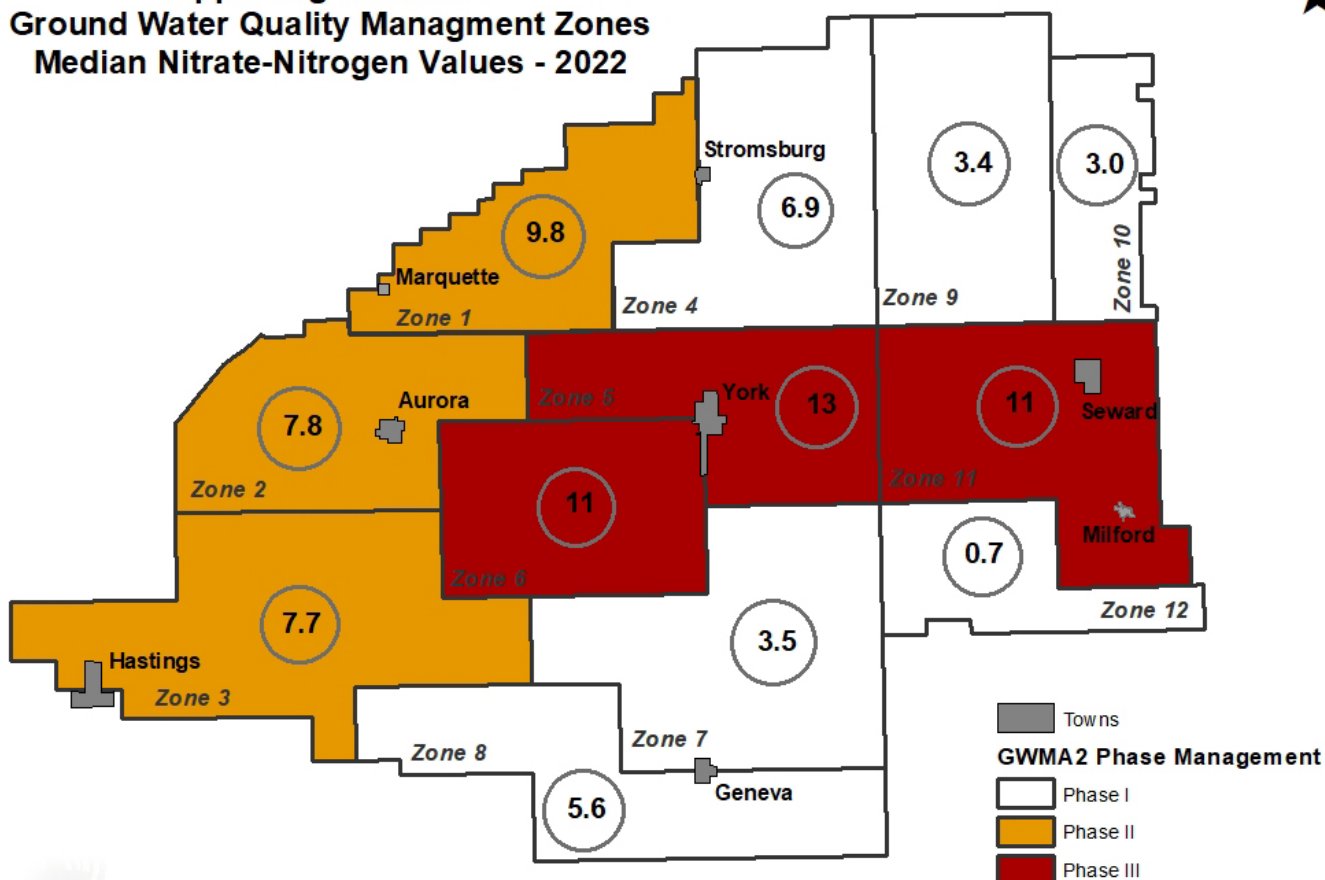
Each of the three zones currently in the Phase III management area saw an increase in median nitrate values in the past year. Other zones of the district saw no change or some decline.

The Upper Big Blue NRD has been monitoring groundwater quality since 1997 through a network of irrigation, municipal, dedicated monitoring, and domestic wells the district refers to as GWMA#2 (Groundwater Management Area #2). The GWMA#2 is comprised of 12 management zones delineated based on aquifer properties, land use, and geologic formation. The median nitrate value for each zone determines the phase of management and therefore, rules and regulations. According to the NRD's Rule 5, a zone will move into Phase II management at 7 milligrams of nitrogen per liter (mg/L) in



median samples and into Phase III at 10 milligrams per liter. Fertilizer management practices requirements increase with each Phase (see pages 10 & 11). ♦♦♦

**Upper Big Blue NRD
Ground Water Quality Management Zones
Median Nitrate-Nitrogen Values - 2022**

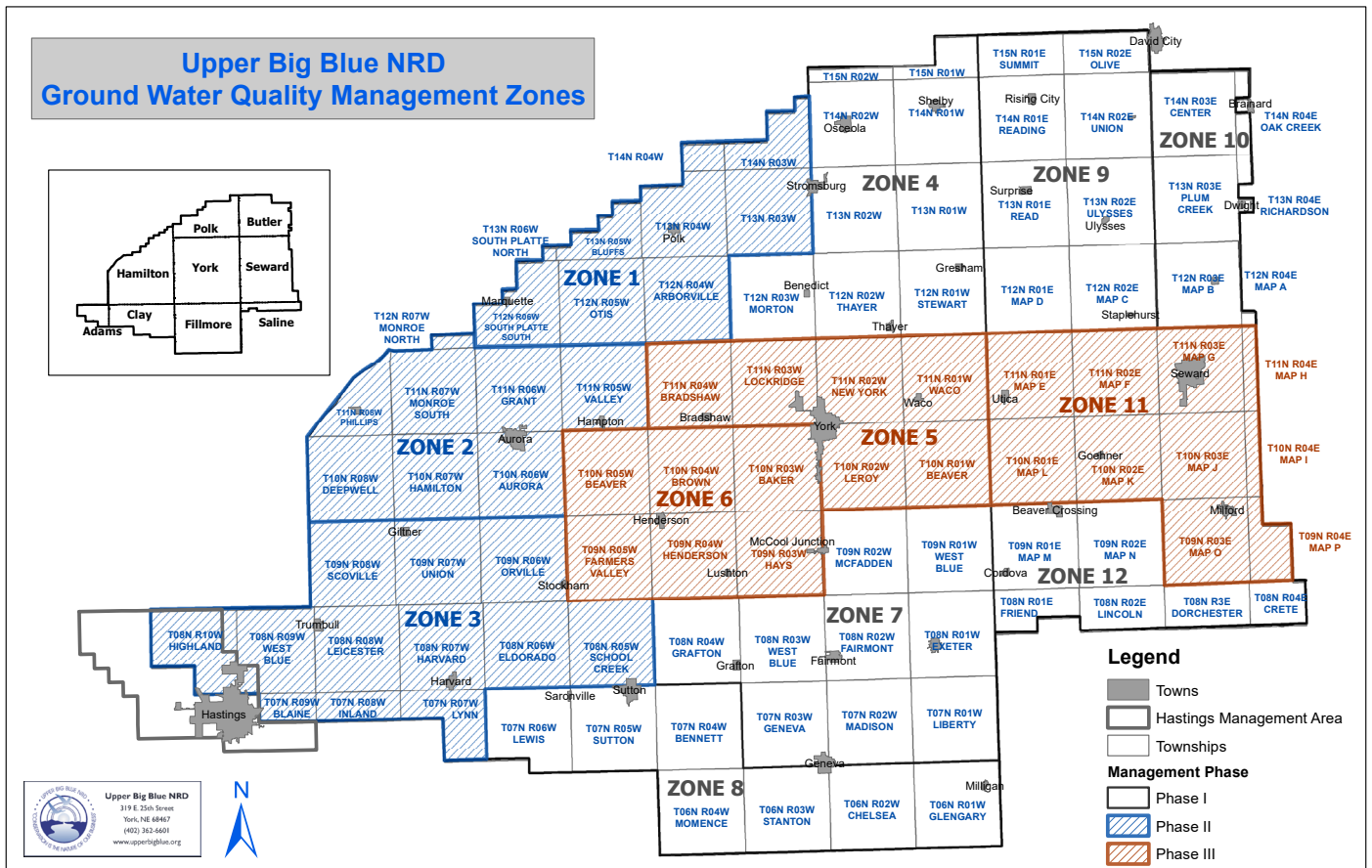


Vadose Zone Study Continues

The Upper Big Blue NRD has partnered with the University of Nebraska-Lincoln to take part in a research study focusing on investigating the vadose zone. The vadose zone is the area beneath the root zone and above the groundwater table. It is also referred to as the unsaturated zone. The focus of the study will be to look at groundwater nitrate and agricultural contaminant occurrence in the vadose zone. To do this, we will be looking at both historic and spatial changes in groundwater nitrate throughout the district and in the 12 water quality management zones to compare the changes in nitrate levels. Nitrate levels will be determined by drilling test holes for chemical analysis, along with characterizing the soil type and physical characteristics.

For the past few decades, we have seen a steady increase in nitrogen concentration in some parts of the district. While we have seen decreases in some areas of the district, we have had an overall increase of 54%.

We will continue sampling in the fall of 2022 and spring 2023, and we are looking for volunteers who are willing to take part in the study. Volunteers, if selected, will be asked to fill out a survey to look at current and historical management practices on the fields to be used in the study. For the fall of 2022, we will be sampling in zones 6, 7, and 8. In 2023, we will be sampling in zones 1, 2, and 3. Finally, in 2024, we will finish up in zone 9, 10, 11, and 12. If you have any questions, or are interested in participating in the study, feel free to contact Dawson Tietmeyer at the Upper Big Blue NRD at (402)362-6601. ♦♦♦





Cover Crops for Weed Suppression

One important benefit of cover crops is that they can provide another option in controlling weed populations--especially weeds that can resist herbicides.

Weeds that have evolved characteristics that make them very difficult to control are on the uprise, and Palmer Amaranth (pigweed family) is at the top of the list. Palmer Amaranth is native to the southwestern United States and has moved eastward, competing with cotton in the South. It has since spread north to where it is now competing with corn and soybeans all through the corn belt.

Because farmers have depended so heavily on an herbicide-only system to control weeds,



the weeds have developed a resistance to herbicides rapidly. Here is where cover crops can be used to help cut back the use of herbicides and thus slow the acceleration of resistance.



Cereal rye has the best potential to help suppress weeds mainly because it produces more above ground biomass than other crop species. Many factors influence the amount of biomass produced by cereal rye, but the most important are when the rye is planted and when the rye is terminated

Seeding rates of 1-1.5 bushels per acre is recommended with the higher rate applied when using an airplane or planting later in the year as in late October or November.

Delaying termination of rye until past mid-May will provide maximum biomass and the most persistent weed suppression. Interested in trying cover crops? The Upper Big Blue NRD has several programs available for cost-sharing on conservation practices including cover crops. Call Dan at (402) 362-6601 to learn more. ♦♦♦

(left and above) Palmer Amaranth has become a big problem for growers throughout the region.





Miranda Coffey
Water Data Specialist
mcoffey@upperbigblue.org

Water Use Reporting for Storm Damaged Fields

Our district was largely impacted by damaging storms this growing season. As a result, operators may have wells with little to no water use, or changed their method of irrigation on some fields (i.e., had pivots down so laid out pipe).

While a properly functioning meter is required on all wells, we realize some meters may have been damaged and unable to be repaired/replaced at this time. Please report hours for these wells and note why hours were reported (i.e., broken meter).

Please note these types of changes on the 2022

water use report. For online reporting, these notes can be made in the “Producer Comment” field.

Noting these changes will give us explanations for changes in water use and hopefully save operators a phone call from our staff. ♦♦♦

Producer Survey

Operators of wells within our Groundwater Monitoring Well Network should have received a land practice survey along with their nitrate results this year. The purpose of this survey is to help us understand what is going on at the land surface as it directly relates to the quality of the groundwater. The survey focuses on nitrogen application, as well as irrigation usage. Operators should expect to receive this survey annually for the next few years. This survey will not be used to single anyone out over their land practices. Paper copies of the survey can be sent back to our office, or they can be filled out online at upperbigblue.org/gwma-2-producer-survey. To unlock the survey, you will need to know your well registration number (found on your results letter).

Nitrogen Management Certification Training

- Dec. 13 | Leadership Center | Aurora | 9 - 11 a.m.
- Dec. 13 | Cunningham’s on the Lake | Kearney | 11:30 to 1:30 p.m. | meal provided, RSVP required | *Renewals only, no new certifiers*
- Dec. 14 | Leadership Center | Aurora | 5-6:30 p.m. | meal provided, RSVP required | *Renewals only, no new certifiers*
- Jan. 19 | Holthus Convention Center | York | 9-11 a.m.
- Feb. 14 | Leadership Center | Aurora | 9-11 a.m.

Visit upperbigblue.org/events for full details and to RSVP



Groundwater Quality Sampling Schedule

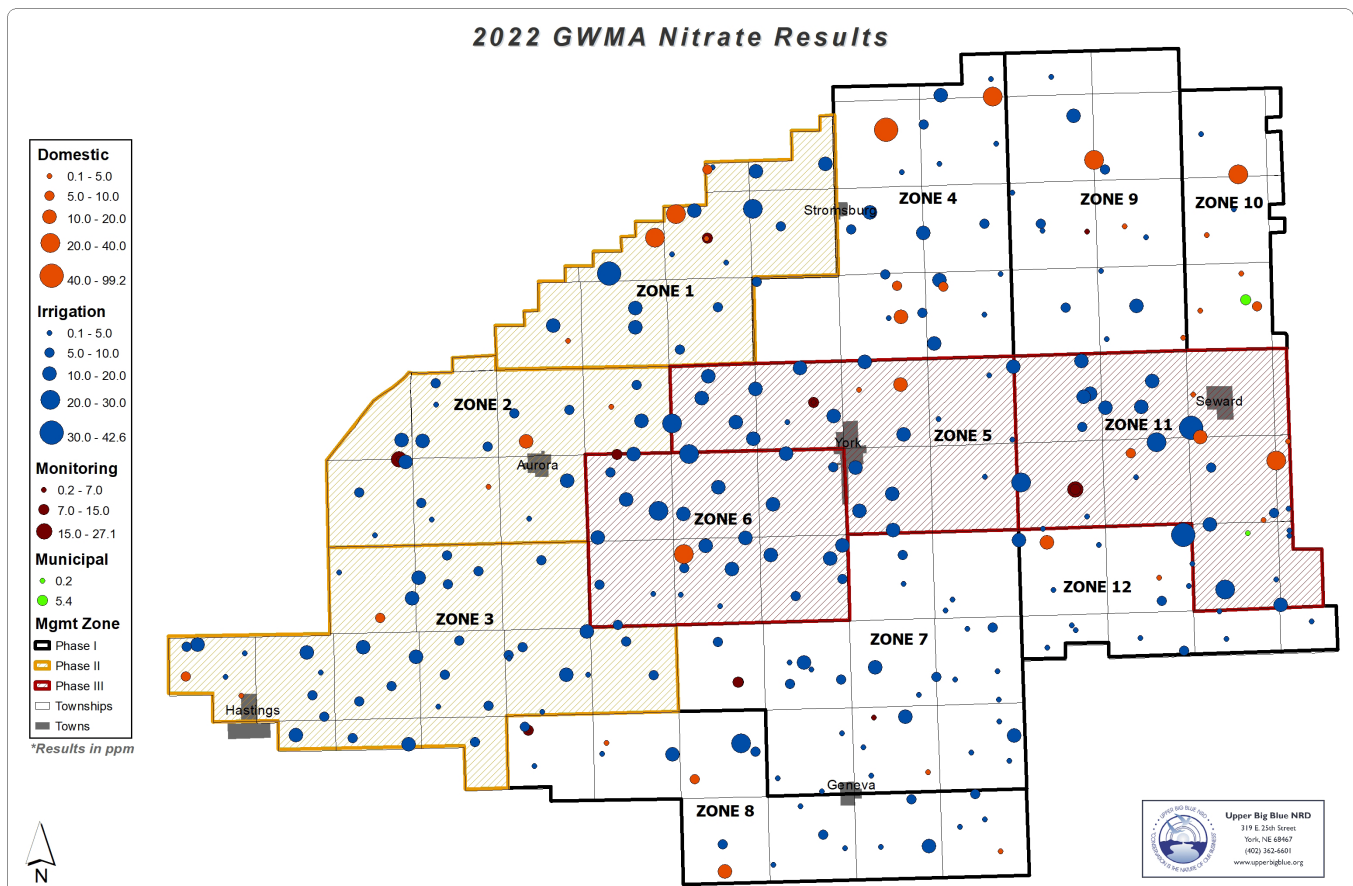
The Upper Big Blue NRD is divided into 12 groundwater quality Management Zones. The median nitrate value for that zone determines the phase of management and therefore, rules and regulations.

Taking a step back, the median nitrate value for a zone is the product of water samples collected from a specific network of wells. These wells are selected based on construction and geology. A well that provides accurate results is screened in one portion of the aquifer only, and does not have multiple screens. The screen also does not transect geological confining units such as clay layers, which could mix shallow and deep water.

Currently, there are 287 wells in the water quality network. Most of the wells are irrigation, with some monitoring, domestic and public wells. To annually collect a water sample at each of these wells would be incredibly difficult given the sheer size of the District - over 1.2 million irrigated acres! Therefore, a rotation of zones below the Phase II trigger of 7.0 ppm was created. This means that if the median nitrate value of a Zone is below 7.0 ppm, it will be sampled once every three years. If the median nitrate value is above 7.0 ppm, that Zone will be sampled annually.

In 2022, District staff sampled wells in Zones 1, 2, 3, 5, 6, 9, 10, 11, and 12. In 2023, District staff will sample wells in Zones 1, 2, 3, 4, 5, 6, and 11.

Thank you to all irrigation, domestic, and monitoring well owners for your continued cooperation. Protecting groundwater quality is an important task and your support is valuable. ♦♦♦



Producer-Reported Data Analysis Shows Less Fertilizer, Similar Yield

According to data reported to the Upper Big Blue Natural Resources District, some district corn growers are not seeing maximum return on their fertilizer investment. This conclusion is based on information provided by corn growers in Phase II and Phase III management areas, which reveals that those who are growing continuous corn and those using a corn and bean rotation are using similar quantities of nitrogen, meaning those growing soybeans may not be taking a full legume credit on their nitrogen calculations. On average those growing beans in their rotation only applied 15 pounds less nitrogen than those growing corn. While this shows a certain level of nitrogen use efficiency, there is still room for improvement.

The graphs provided by the NRD (available at www.upperbigblue.org/NUE) that chart this data show that producers in Phase II and III areas growing corn on corn from 2017-2021 applied a range of less than 50 pounds to over 350 pounds of nitrogen per acre, with

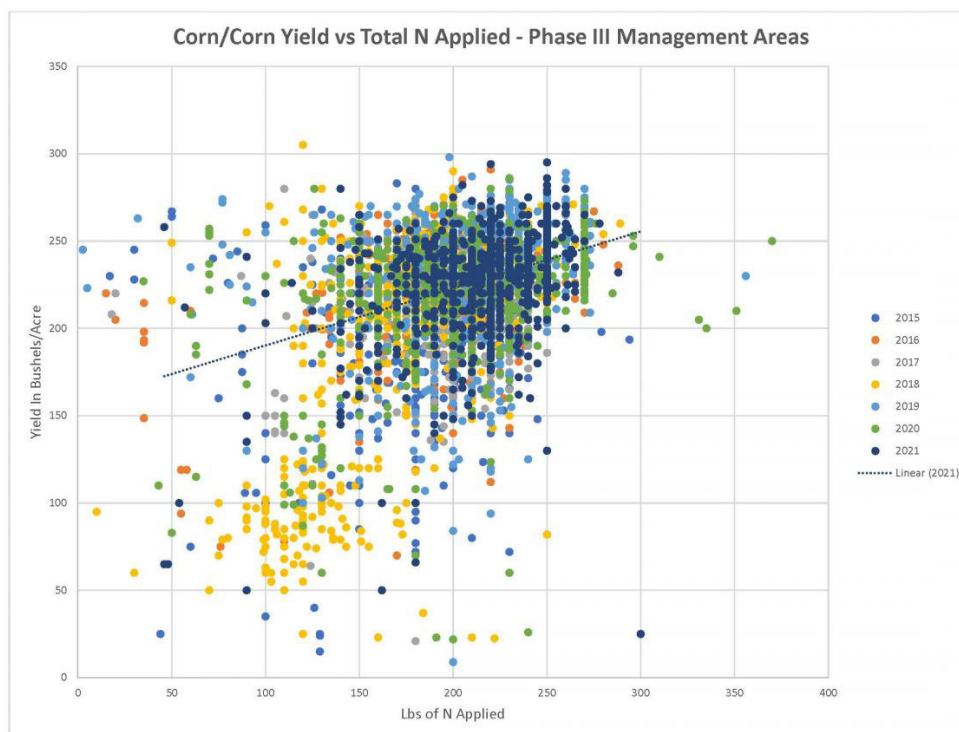
the bulk of producers falling in the 150 to 250 pounds per acre range. Similarly, yields for that group ranged from less than 50 to over 300 bushels per acre, with the majority falling between 200 and 250 bushels per acre. For the corn/bean rotation fields for the same period, the numbers are remarkably similar. Producers applied a range of less than 50 up to 400 pounds per acre, with the majority applying between 150 and 250 pounds per acre. Yields ranged from less than 50 to over 300 bushels per acre.

The nitrogen use efficiency numbers reported in this period ranged from 0.61 to 1.61. The majority of years in this period showed NUE of less than 1, however the trend line has continued to increase over this period.

“Our concern is that producers aren’t taking enough credit for their residual nitrogen and legumes in their nitrogen calculations,” explains Dan Leininger, NRD water conservationist. Additionally, Leininger says throughout the 2017-2021 period, the rate of nitrogen applied to all fields in Phase II and III areas increased, while yields did not. This continued increase in fertilizer use, without a corresponding yield increase, means there is likely nitrogen over application. This wasted fertilizer is left over in the field after the growing season—which directly impacts the quality of the water in the district.

“Every year, if you over apply nitrogen by even 30 pounds, it adds up in the system,” said Leininger, who recommends producers split apply fertilizer rather than apply 100 percent preplant to increase efficiency. “Soil isn’t a good storage place for fertilizer. As much as you can, apply fertilizer in season.” ♦♦♦

See additional charts and information on this topic at www.upperbigblue.org/NUE.



Incentive Program Expanded

Additional Payments For Producers in Water Quality Target Areas

The Upper Big Blue Natural Resources District offers an incentive program for producers in portions of the Recharge Lake Watershed, the Beaver Creek Watershed, and some municipal Wellhead Protection Areas. Practices included in this program are cover crops, buffer/filter strips, and land treatment practices. The area covered by these programs has increased since this program was announced last year, so if you didn't qualify previously, you may qualify now. The new boundaries for the program encompass the entirety of the Beaver Creek watershed.

The purpose of the program is to increase incentives for producers who are interested in installing these important conservation practices. Cover crops and buffer strips are simple ways to improve water quality, as they keep sediments and agrochemicals on the fields instead of washing into waterways.

“Our hope is that this program will allow more producers to plant cover crops and filter strips to improve the quality of the water in our district in key areas where we know we can make a significant impact,” said Marie Krausnick, assistant general manager at the Upper Big Blue NRD. “We want to make it as simple as possible for producers who have been thinking about installing these practices to go ahead and take action now and get started.”

These two practices were among those identified by a district stakeholders group as those that are likely to be adopted by the district's agricultural community, if the right incentives and supports were in place. The stakeholder group that made recommendations to the board of directors of the NRD included landowners, operators, agribusiness owners, recreationists, municipal representatives, and livestock producers in the Beaver Creek watershed. They met from January to March of 2021 to discuss water quality issues in the district and hosted an open house event to present

ideas to the public. Materials from these meetings are available at upperbigblue.org/WQMP.

As with much of the state of Nebraska, water quality concerns in the area targeted by this program include nitrates, which are known to cause adverse health outcomes for humans. The program will also help with concentrations of atrazine and phosphorus, which harm wildlife that depend on streams, lakes, and rivers in the district. If widely adopted, this new incentive program could improve the quality of drinking water in the district, as well as improve the recreational opportunities at Bruce L. Anderson Recreation Area in York, where the fishery has been dramatically decreased due to poor water quality.



Dan Leininger, Water Conservationist, Upper Big Blue NRD

Producers who are interested in applying for the incentive program can call Dan Leininger at the NRD office at (402) 362-6601, or complete a short form on the NRD website. The application process is quick and easy to allow for installation of conservation practices. This program is funded directly by the Upper Big Blue Natural Resources District and is not affiliated with any federal conservation programs. However, the program does include collaboration with local NRCS soil specialists to ensure best results. Full program details at upperbigblue.org/WQMPIncentiveProgram. ◆◆◆



Management Area Rules and Regulations

Phase I Requirements –

All operators within the district are subject to the requirements of Phase I.

- 1. *Fall Applied Anhydrous Ammonia***
Application of fall anhydrous ammonia before November 1 is prohibited.
- 2. *Pre-Plant Liquid or Dry Nitrogen Formulations***
Pre-plant nitrogen applications in liquid or dry forms are prohibited before March 1.
- 3. *Exemptions to Items 1 & 2***
The application of nitrogen fertilizer for any purpose other than fertilizing spring planted crops.
 - The application of nitrogen fertilizer for spring planted small grains such as barley, oats and rye.
 - The application of fertilizer that is not considered a “nitrogen fertilizer” as defined in Rule 5 of the District Ground Water Management Rules and Regulations.
 - The spreading of manure, sewage and other by-products conducted in compliance with state laws and regulations.

Phase II Requirements –

All operators of land within district Management Zones 1, 2, 3, 5, 6, and 11 are subject to the requirements of Phase II. Refer to the map on page 3 for Phase II areas. Phase II operators are required to follow all Phase I requirements in addition to the following:

- 1. *Nitrogen Certification Training***
Farm operators must attend a nitrogen certification training once every 4 years.

- 2. *Irrigation Scheduling***

Irrigation scheduling equipment is required in at least one field in a Phase II area. The equipment should be installed in the largest field you operate. Examples of irrigation scheduling equipment are:

- Capacitance Probes
- Resistance Blocks
- Other methods approved by the District

- 3. *Soil Sampling Requirements***

Soil samples are required in years when corn or sorghum will be grown following a non-legume crop and/or when livestock, municipal or industrial waste has been applied within the last 12 months.

A minimum of:

- 1 composite 0-8” sample per field analyzed for organic matter and residual nitrogen, and
- 1 composite 8-24” sample per field analyzed for residual nitrogen are required.

For soil sampling purposes, a field is defined as one where the crop and irrigation practices are the same.

- 4. *University of Nebraska Recommended Nitrogen Fertilizer Application Rate***

Prior to applying nitrogen fertilizers, the operator must calculate the recommended application rate based on the University of Nebraska’s nitrogen fertilizer recommendation equation. The UNL nitrogen recommendation equation takes into account the residual soil nitrogen from your soil analysis and other nitrogen credits.

- 5. *Reporting Requirement***

An annual report is required for all dryland and irrigated fields by April 1. The report steps you through the University’s Nitrogen Recommendation Equation. A copy of your soil analysis must accompany the report.



Phase III Requirements –

All operators of land within district Management Zone 5, 6, and 11 are subject to the requirements of Phase III. Phase III operators are required to follow all Phase I and II requirements in addition to the following.

1. Soil Sampling Requirements

Soil samples are required in years when corn or sorghum will be grown following a non-legume crop and/or when livestock, municipal or industrial waste have been applied within the last 12 months. A minimum of:

- 1 composite 0-8” sample per 40 acres or any portion thereof, analyzed for organic matter and residual nitrogen
- 1 composite 8-24” sample per 40 acres or any portion thereof, analyzed for residual nitrogen are required.

2. Irrigation Water Sampling

All irrigation wells must be sampled and tested for nitrate once every 3 years. You are free to use any lab you wish, but the NRD offers nitrate testing free of charge.

3. Fall and Winter Application of Anhydrous Ammonia

All anhydrous ammonia applied between the dates of November 1 and February 29 must be applied with a district approved nitrification inhibitor. Active ingredients include: Nitropyrin, Pronitridine, and Dicyandiamide. A receipt as proof of purchase must accompany your annual report. ♦♦♦



APPLICATIONS ARE OPEN!

COST-SHARE OPPORTUNITY FOR NEW CONSERVATION PRACTICES



www.upperbigblue.org/soilcarbonproject



What's in Your Water?

Water quality test kits & RO system funding available

If your home's water comes from a private well in Nebraska, you may have elevated levels of common nutrients found in agricultural fertilizers in your drinking water. Consuming water with elevated levels of nitrate-nitrogen can have significant health risks. Annual testing of your water is an important way to protect the health of everyone in your home.

Thanks to a partnership with UNL, the Upper Big Blue NRD can now mail simplified at-home test kits to district residents for free that will indicate if there is an elevated level of common contaminants in the water. To request a kit, call (402) 362-6601 or email info@upperbigblue.org with your home mailing address. The at-home kits are not as sensitive as having a sample tested in the lab, but they do provide a simple way to determine if additional testing is required and to identify what further steps need to be taken to improve drinking water quality, such as installing a reverse osmosis filter. Funding is available through the Nebraska Department of Environment and Energy for homeowners and communities with elevated nitrates to install reverse osmosis systems. More information on these resources is available at <http://dec.ne.gov>.

Why Should I Test My Water?

Numerous scientific studies have looked at the relationship of nitrate in drinking water on human health and linked high concentrations of nitrate in drinking water to adverse health outcomes. The



strongest links are for methemoglobinemia, colorectal cancer, thyroid disease, and neural tube defects (birth defects of spine, brain, and spinal cord). Agrichemicals in drinking water are also linked to increased heart rate, nausea, headaches, and abdominal cramps; cancers including pediatric brain cancer, kidney cancer, bladder cancer, and non-Hodgkin's lymphoma. Other studies are also examining a possible link between these contaminants and Alzheimer's, diabetes, and Parkinson's disease.

Nebraska has one of the highest rates of some pediatric cancers, which may be linked to agrichemicals in drinking water. When it comes to health concerns and drinking water quality in Nebraska, the most vulnerable populations are young infants (less than six months old), pregnant women and children in-utero, and people with oxygen transport or delivery conditions like anemia, cardiovascular disease, lung disease, and sepsis.

The EPA guideline for safe drinking water is less than 10 parts per million of nitrate. Municipalities are required by law to provide water that meets the EPA criteria, but for the many Nebraskans whose water comes from a private source, the quality of the water is the consumer's responsibility.

For private well owners, it's important to test drinking water annually, as results can change from year to year. If the results of the at-home water quality test reveal greater than 5 parts per million of nitrate, the NRD staff recommends following up with a lab test for verification and to determine next steps to ensure safe drinking water. NRD lab testing for nitrate and bacteria is always free for district residents. ♦♦♦

