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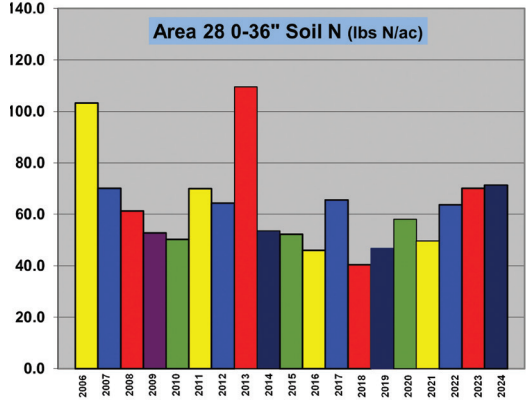
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Sampling Effectively for Nitrogen

Soil sampling has long been the traditional way to measure nitrogen in soil. That process allows producers to make an informed estimate of how much commercial nitrogen to add. When soil sampling, we test for nitrate and organic matter. The Lower Loup NRD requires every 40 acres of irrigated ground be sampled annually within the Water Quality Management Areas so designated due to high nitrate groundwater contamination.



The graph represents soil nitrates results in Water Quality Management Area 28 (Platte County) based on soil samples taken from approximately 450 fields each year for the last 19 years.

Recently, there have been advances in determining nitrogen rates and nitrogen application for pivot irrigated corn fields utilizing fertigation (chemigation). Fertigation is the application of nitrogen fertilizer or other chemicals in the water dispersed through an irrigation

system. The advanced system uses satellite imagery repeatedly collected during the crop season to determine timing of nitrogen application. Pivots with newer electronic controls can vary the rate of nitrogen application by adjusting the speed of the pivot and/or the injection rate of the fertilizer. In order for the rate and timing of nitrogen fertilization to be determined, small plots of under fertilized and over fertilized blocks need to be established side by side and multiple times in the field.

These plots are usually established at side-dress with a ground rig or with a pivot resulting in pie wedge shaped areas. The differences in color in the plots and the rest of the field determine if an application should be made. It is common for fields using this technology to not use more nitrogen than what was applied to the under fertilized

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Wellhead Protection

Approximately 85% of Nebraskans rely on groundwater resources to provide water for their families. Communities, which only cover about 1% of the land, are responsible for providing a clean source of drinking water to their residents.

Wellhead Protection is a program geared towards protecting a specific area around a community well or wellfield to ensure no contaminants from the land surface reach the water table below. These Wellhead Protection Areas often extend beyond city limits to include surrounding rural land.

Wellhead Protection promotes the use of best management practices for rural and urban areas. This includes producers taking advantage of nitrogen credits and not over-applying fertilizer. Filter strips and buffer strips, including grassed waterways, can limit runoff and pesticide transport within an agricultural area. The Lower Loup NRD has controls in place, such as no new high-capacity irrigation wells and no new certified acres being transferred into an existing Wellhead Protection Area.

These measures help protect the source of a community's well water.

By looking at sources of contamination and then educating the public about the potential risks to drinking water, hazards can be reduced, and the water resource is protected.

A good example is properly closing abandoned or improperly sealed wells to prevent surface water from running down the well casing.

Agencies involved with Wellhead Protection efforts include the Nebraska Department of Environment and Energy, Natural Resources Districts, and the Natural Resources Conservation Service (NRCS).

The LLNRD offers advanced soil sampling incentives to producers to test for residual nitrogen in soil. NRCS also provides cost-share for nutrient management and irrigation water management.

So, the next time you see one of these signs, remember that a community is actively protecting one of Nebraska's most valuable natural resources.



Those soil samples should be gathered after crop harvest and before any nitrogen is applied to fields. Soil gathered for organic matter analysis is obtained by boring at least 10 bore holes, 8 inches deep, in each 40 acres or management unit and the soil from those bore holes mixed to form a composite sample sent to a certified lab for organic matter analysis.

Soil gathered for nitrate analysis is collected by boring 36-inch-deep holes from at least 4 sites in each 40 acres or management unit. Soil from those sites is combined into a composite sample submitted to the lab for nitrate analysis. Samples should be refrigerated and promptly delivered to the lab.

Soil variability is obvious in agriculture fields as evidenced by the response/appearance of corn plants. Darker corn results in soils with higher organic matter or in areas that have more nitrogen. Lighter colored corn plants develop where soil is less fertile. Because this variability can exist even within each 40 acres or management unit, it is recommended that soil sampling sites be marked with GPS so that the same sites can be probed each year. Returning to the same sites reduces the effect of that variability, which allows producers to concentrate on adjusting the commercial nitrogen application to the needs of corn rather than the variability in the soil (for that management unit).

plots. Small, incremental applications of nitrogen allow the opportunity to not apply any additional N. Analysis of the data can happen within one day.



Rising Nitrate Levels Are Contaminating Groundwater

Nitrate levels in parts of Nebraska, including areas within the Lower Loup Natural Resources District, are on the rise.

The Safe Drinking Water Act requires that nitrate concentration in drinking water does not exceed 10 milligrams/liter (often cited as 10 parts per million, or 10 ppm). That threshold was established to prevent methemoglobinemia (Blue Baby Syndrome), a disease that deprives infants of oxygen, evidenced by the development of a bluish-gray tint to the skin. This condition can lead to coma and death.

Researchers at the University of Nebraska Medical Center have published scientific data showing that prolonged exposure to drinking water containing even less than the 10 ppm threshold is associated with increased occurrence of birth defects, thyroid disease – and kidney, ovarian, bladder, and colorectal cancers.

Excess fertilizer originally applied to farm fields is a major source of nitrate pollution in groundwater and surface water sources in Nebraska. Knowingly applying more fertilizer than crops can use is wasteful financially and a threat to human health.

In addition to health concerns, the cost of treating nitrate polluted water is expensive for communities, with costs typically passed onto customers. Rural residents with contaminated domestic wells incur high costs for treating their water, installing new wells, and/or purchasing bottled water.

The preferred solution is to prevent nitrate pollution from reaching water resources in the first place.

There are many agricultural practices that producers can implement to decrease the amount of fertilizer applied to crops while saving money and preserving yield. Soil health can also benefit when practices such as no-till or conservation tillage, rotational grazing, and planting cover crops are used.



Lower Loup NRD experts are available to assist ag producers and answer questions about these and other practices, available cost-share programs, and the latest findings in nitrate science.

contaminants like selenium, arsenic, and manganese are also present in groundwater within the LLNRD.

It is important to remember that if you get your water from a private well, and not from a public water supply, to have your well water tested at least once a year.

Water quality is especially important, but having enough quantity can also be a consideration. This became apparent and was heightened by recent drought conditions. The LLNRD has a Drought Management

The Lower Loup Natural Resources District is home to 43 communities with public water supplies. Each community system complies with many regulatory requirements to provide safe, clean drinking water to residents. Samples are routinely taken to ensure that levels of a whole host of contaminants are under the safe drinking water limit.

The maximum contaminant level for nitrates, set by the Environmental Protection Agency is 10 parts per million. Nitrates are rising in many parts of Nebraska and in portions of the LLNRD, too. Other

LLNRD Works with Communities and Residents to Protect Water Quantity and Quality

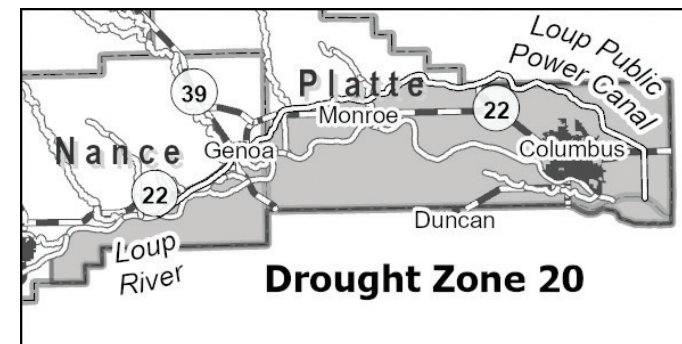
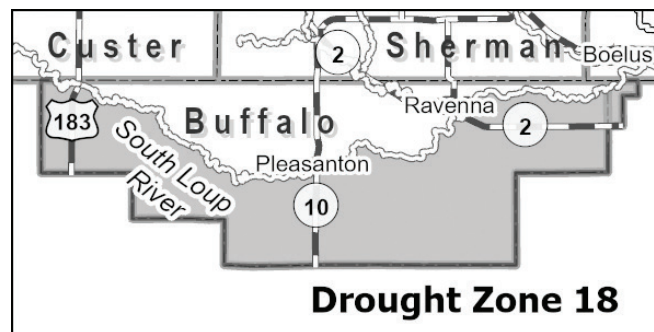
Flow Meter Installation Requirement and Cost-share

On January 25, 2024, the Lower Loup NRD Board of Directors voted to designate Water Management Areas 18 and 20 as Water Quantity Management Sub-Areas. In 2023, Areas 18 and 20 triggered the Lower Loup NRD's Drought Management Plan's Severe Drought Management Actions based on:

- 1) The U.S. Drought Monitor Status listing the areas as greater than 50% Severe Drought and:
- 2) Greater than 50% of areas' static groundwater levels within the drought zones at or below 10% of the areas' wells 25-year historical static water level.

As a result, flow meters are required to be installed on all irrigation water sources used for row-crop farming within these areas by February 2026.

The Lower Loup NRD is offering cost-share assistance for the installation of flow meters within the newly designated Water Quantity Management Sub-Areas 18 and 20. LLNRD is offering 50% cost-share of the flow meter installation costs of up to \$2,000 per field. This cost-share covers the purchase of a flow meter, flow conditioners, straightening veins, check valves, and canopy covers. Flow conditioners and/or straightening veins are needed at any site that has less than 10 pipe diameters of uninterrupted linear flow. All meters must have a totalizer that reads in acre-inches, an anti-reverse mechanism, and an overrun bearing. The meter must be installed by a certified contractor and only meters that are included on the Lower Loup NRD's approved flow meter list will be considered. Pipe conditions



are very important for correct installation, please be aware that plastic or thin-walled aluminum gravity pipe will not meet specifications.

A flow meter will be required on each irrigated field within these areas. For example, a field equipped with a pivot and gravity irrigation will require a flow meter on each system to account for the difference in irrigation.

Flow meter cost-share must be approved prior to equipment purchase and installation, and all work must be completed within nine months of the approval date. Once complete, paid receipts for the flow meter purchase and installation, with the field description indicated, must be submitted.

An LLNRD technician must inspect the flow meter for installation certification and be allowed access to the meter for periodic inspection, verification of irrigation totals, and maintenance. LLNRD will be responsible for maintenance of the cost-shared flow meter and will cover any maintenance costs under \$25.

Other Natural Resources Districts in Nebraska are also requiring flow meters in areas where water quantity supplies are at historically low levels.

Direct questions to the Lower Loup NRD at (308) 728-3221.

Plan in place to help mitigate drought impacts. It is important for communities and private well owners to contact LLNRD if water quantity is impacting your well's pumping capacity.

Wellhead protection and source water protection plans can be utilized to protect a community's water source. These are programs aimed at implementing best management practices on the land to reduce the risk of contamination of the aquifer. LLNRD, the Nebraska Rural Water Association, and the Nebraska Department of Environment and Energy are among the agencies that can assist.

The LLNRD has regulatory authority to help protect the groundwater of the District. The District's Groundwater Management Area Rules & Regulations became effective in 2002 and recently the Drought Management Plan was approved by the LLNRD Board of Directors.



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