LLNRD Vadose Zone Study is Expanding

The LLNRD pilot project to study the vadose zone, which began in the eastern portion of the District, is expanding. The vadose zone is the layer of unsaturated soil between the land surface and the groundwater table below. If nutrients like nitrogen and ammonium escape or leach through the vadose zone, they can end up in aquifers, contaminating the water that we drink.

Thanks to a Water Sustainability Fund grant administered by the Nebraska Department of Water, Energy, and Environment, the project is expanding within the Lower Loup NRD to include Wheeler and Custer Counties, and also to additional areas in the Upper Big Blue NRD and Central Platte NRD (CPNRD). Roughly one-third of the state's irrigated acres (3.5 million total) are within these three project NRDs. The U.S. Geological Survey (USGS) is partnering with the three NRDs to assist with field and data monitoring along with a final written report.

"This collaborative effort between the USGS and the three NRDs will provide invaluable insights into how fertilizers, particularly nitrates, move from the root zone toward critical aquifiers in some of the most vulnerable areas of central Nebraska," said Lyndon Vogt, General Manager of the CPNRD. "The findings will help inform the agricultural community and the public about better land and water management practices."

By expanding the project, this allows the NRDs to study a wide range of soil types and textures, along with different farming and fertilizer application practices. Some examples include fall application of anhydrous ammonia, fall application of injected manure, and pre-plant and multiple in-season applications – also known as spoon feeding of the crop. Other strategies being researched for fertilizer management include canopy color tracking using daily satellite imagery to determine crop stress. This helps producers know when crops need additional water or nutrient applications.

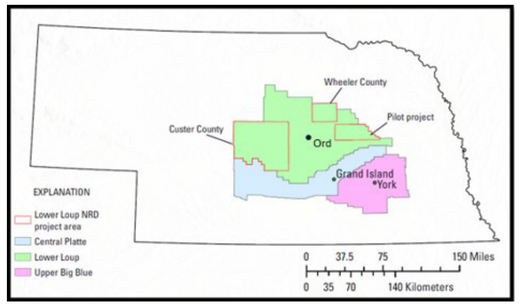
The two primary nutrients that the grant is studying and sampling for are nitrate (NO_3-) and ammonium (NH_4+). Sampling is done pre-plant and post-harvest to depths of up to 30 feet and multiple times throughout the growing season to a depth of 8 feet to understand the movement, or transport rates, of these important nitrogen fertilizers. Both irrigation water and nutrient management are key components to growing crops. Soil texture, or the percentage of sand, silt, and clay, is a major factor in how quickly water and fertilizer move through the soil profile. With the expansion of the initial project, the Lower Loup NRD can study areas with very high sand percentages (sand and loamy sand) to areas with increased clay content (silty and silty clay loams).

The study also utilizes soil water sensors to record moisture level and temperature at nine different depths down to a depth of one meter. Moisture probes can help with irrigation water management by assessing how deep crop roots can reach into the soil profile to uptake available water. Some probes that are permanently installed record both moisture and temperature year-round, which affects biological activity in the soil and aids in nutrient application timing decisions.

Alongside the soil moisture data, flow meters and weather stations record both irrigation water applied and total precipitation received during the growing season. The flow meters are equipped with telemetry so the NRD can experiment with trending technology for collecting real-time data.

The first year of sampling for the expanded areas of the study will conclude after the post-harvest vadose samples are collected later this fall.

For more information, contact the Lower Loup NRD at (308) 728-3221.



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Protecting Lives, Protecting Property, Protecting the Future.

IN THE LOUP is a publication of the Lower Loup Natural Resources District. It is published quarterly by the **LLNRD** and is distributed to the residents of the 16 counties that make up the District. I**N THE LOUP** is edited by Alan J. Bartels, Information & Education Coordinator.

A Message from the Manager

LLNRD General Manager Russell Callan

The Lower Loup NRD has multiple programs like documenting the movement of nitrates through varying soil types, recording static water levels, monitoring water quality, chemigation inspections and other scientific processes to answer longstanding questions about our valuable resources. But one thing remains the same no matter where within the Lower Loup NRD we are collecting data and doing science – it is only because of the landowners and ag producers who allow us access to their land that we are able to gather the important scientific information needed that will help protect Nebraska's water quality and ultimately human safety within and also beyond the Lower Loup NRD.

We rely on those landowners and agricultural producers and consider them as our partners in this important work. Without their involvement, we would not be able to gather the data needed for this research. Our management and staff work to create and maintain trust with all of our partners while always respecting their property and concerns. I appreciate the open dialogue that has developed between the LLNRD and our friends on the farm and ranches of our District.

While we don't expect our agricultural partners to haul our heavy soil probes and other data gathering equipment in and out of their fields (I have technicians for that), we do appreciate their trust when it comes to accessing their land.

To all of the landowners and ag producers across the Lower Loup NRD who see my staff members measuring static water levels, inspecting chemigation equipment, taking water or soil samples or otherwise coming and going and continue to permit us to perform our important work on their land – thank you!

LOWER LOUP NATURAL RESOURCES DISTRICT

VOLUME 18, ISSUE 3 SUMMER 2026

IN THE LOUP

Eco-friendly Coconut Mats Give Young Trees a Fighting Chance Against Weeds

When it comes to planting trees, it is never too early to begin planning to give young trees the best chance at survival. Along with proper site preparation and species selection, weed suppression is a very important ingredient in healthy tree growth.

The Lower Loup NRD (LLNRD) sells tens of thousands of trees and shrubs each year. Several dozen species are typically available during the LLNRD tree season that begins in November and runs to early April. To help those trees and shrubs survive to maturity, the Lower Loup NRD sells coconut mats used to suppress the growth of weeds, grasses, and other competing plants that can crowd a young seedling and steal important moisture.

Each mat is constructed with 100 percent compressed coconut fiber which is naturally biodegradable and stops weed growth while still allowing water and airflow to reach the plant's roots. Plastic sheeting that has traditionally been used for weed suppression tends to trap heat near the roots, drying the soil. By keeping the soil around the plant cool, coconut mats help the soil retain water while boosting the efficiency of each watering event.

The Lower Loup NRD sells the mats individually or in bundles of 25. Three sod staples, which are provided with each mat, hold them in place. For best results the mats should be installed during planting, but can also be added at any time to older plantings. The mats are round and measure 24 inches across. The area around the base of each tree or shrub should be void of other vegetation before installing the mat.

Trees and shrubs are planted for many important reasons. With opportunistic weeds always looking to take root, and considering how often portions of the District are in need of precipitation, these all-natural weed suppression/moisture preserving tools are a critical component of protecting the investments of time and money that people spend on trees and shrubs.

LLNRD Shop/Rec Area Manager Phillip Hill places a coconut mat around a pine tree at the Lower Loup NRD Headquarters in Ord. The mats preserve soil moisture while keeping competing vegetation at bay.

Visit LLNRD.org to opt-in for SMS (text) alerts from Lower Loup NRD.

LLNRD Partnership Protects Public

Throughout the summer the LLNRD partners with the Department of Water, Energy, and Environment (DWEE) to monitor public swimming beaches for harmful algae blooms and *E. coli* bacteria. Samples are collected at five beaches within the District each Monday starting in May and running through the end of September. The lakes that are sampled are Calamus Reservoir (Homestead Knolls and Nunda Shoal beaches), Pibel Lake, Davis Creek, and Sherman Reservoir.

Toxic algae blooms can develop during the summer months when conditions such as higher water temperatures, lower water depths, and elevated nutrients such as nitrogen and phosphorus combine to create an increase in the toxin called microcystin.

Environmental factors like a high rainfall event can flush nutrients as well as bacterial sources into waterways, which greatly increase the likelihood of an algal bloom as temperatures increase.

According to the Beach Watch tab found on the DWEE website's home page, the Environmental Protection Agency has recommended the 8 parts-per-billion (ppb) microcystin concentration as the basis for swimming advisories in recreational waters to protect public health. When a lake samples at or above 8 ppb of microcystin, DWEE and the Nebraska Department of Health and Human Services will issue a joint Health Alert, and designated swimming beaches are closed until the lake samples below 8 ppb of microcystin.

According to Mike Archer, the Assistant Division Administrator – Fisheries (Aquatic Resources) with the Nebraska Game and Parks Commission, "We want visitors to be safe by being aware of the current water quality conditions. Harmful algal blooms can appear quickly during the heat of the summer. People and pets should avoid contact with the water if it is neon green, pea green, or blue green in color, has a foul odor, or looks like grass clippings floating in the water. Activities that bring you in direct contact with the water should be avoided. Fishing, hiking, camping, and picnicking are all good safe options while recreating this summer at one of the many great lakes located in Nebraska."

Lakes that appear neon green, pea green, or blue green – especially in the summer – could be suffering from an algal bloom. In partnership with the Department of Water, Energy, and Environment, the Lower Loup NRD tests for unsafe water conditions at several popular recreational water bodies.

High levels of *E. coli* bacteria can also pose a threat to people in the form of gastrointestinal problems and flu-like symptoms. This can occur if water containing *E. coli* is swallowed while swimming or during other recreational activities.

To subscribe to weekly health alerts, send an email to listserv@listserv.nebraska.gov with "SUBSCRIBE DWEE-BeachWatch (and your name)" in the body of the message (leave the Subject line blank).

To learn more, contact the Lower Loup NRD at (308) 728-3221 or visit https://deq-iis.ne.gov/zs/bw/ for Beach Watch updates.

Water Programs Assistant LeeAnn Smith collects a water sample at Davis Creek Reservoir. Smith leads the Lower Loup NRD's efforts to monitor public beaches for harmful algae blooms and contamination by E. coli bacteria. Lower Loup NRD partners with the Department of Water, Energy, and Environment on the Beach Watch program.

Moving Forward: Mud Creek Flood Protection Project

Design has begun on the two dams and one diversion channel north of Ansley as part of the Mud Creek Flood Protection Project. The USDA Natural Resources Conservation Service (NRCS) is providing design funding, and JEO Consulting, Inc. is designing the components in coordination with the Lower Loup NRD and the Village of Ansley.

JEO began surveying for the project in July 2026 and is scheduled to begin geotechnical investigation in August. The geotechnical investigation will concentrate on non-cropland initially and will be conducted on cropland after harvest has been completed. The design is expected to be completed in early 2028. Construction will begin after the design is complete, funding is made available from NRCS, and land rights and permits have been secured by the LLNRD.

The project is located just north of Ansley in Comer Canyon. Runoff from Comer Canyon flows through Ansley causing flooding during high rainfall events. After the dams and the channel are completed, the dams will store runoff and release it slower to minimize flooding in town. The diversion channel, which will be located downstream of the dams, will intercept occasional high flows from the dams and divert them around town.

Lower Loup NRD District Engineer Kevin Gustafson addresses Ansley area residents during a public meeting about Watershed and Flood Protection pertaining to the Mud Creek Watershed.

"It is exciting to see this project moving forward," said LLNRD General Manager Russell Callan. "The staff and Board of Directors of the Lower Loup NRD are looking forward to Ansley gaining some much needed flood protection."

LLNRD Photo Contest Winners Announced

Photographers of all skill levels, from the Lower Loup NRD and across Nebraska, submitted their best images for the 2026 Lower Loup NRD Photo Contest. The winners of the contest have been chosen.

Danielle Bayer of Platte Center won first place in this year's contest with a black and white photo of cattle coming to feed near Columbus. Danielle likes to spend time traveling around the Columbus area taking photographs of farm life and nature.

Mullen resident Misty Horn took second place with a photo of the northern lights taken on the north side of Homestead Knolls at Calamus Reservoir. Misty is a hobby photographer and stated, "This photo reminds me that beautiful things come and go. We are lucky if we can just capture the moment they are in."

The third-place photo belongs to Sarah Tetschner of North Loup. From a vantage point near Calamus Reservoir, Sarah captured a snapshot of a supercell storm that traveled over central Nebraska in June of 2025.

"This was the fifth year for our contest," said Alan Bartels, the Lower Loup NRD's Information and Education Coordinator. "We continue to receive beautiful images from across the District. I hope that people are exploring the Lower Loup NRD this summer and have their cameras along for the adventure. We'd love to see their best images when our next photo contest opens in late 2026."

First Place: Danielle Bayer's black and white photo of a photogenic bovine took first place in the LLNRD's 2026 Photo Contest.

2nd Place: The northern lights became the subject of photographer Misty Horn's camera during a visit to Calamus Reservoir.

3rd place: Sarah Tetschner's photo of a supercell storm over Garfield and Loup Counties.

Central Valley Sophomores Investigate Environmental Issues

For several years, LLNRD staffers have enjoyed giving input after watching presentations on environmental issues by the sophomore class at Central Valley High School in Greeley. During the 2025-2026 school year, the sophomore English class investigated environmental issues impacting Nebraska and the world. These challenges ranged from waste management and depletion of the Ogallala Aquifer to fertilizer runoff, deforestation, overfishing, habitat fragmentation, wildfires, fossil fuel dependence, food waste, and many more. Then, the students wrote letters expressing their views on these issues, with the intent of informing, persuading, and engaging a real-world audience.

English 10 instructor Nikki Underwood mailed the collection of letters to the Lower Loup NRD with a letter of her own. In it she described the students' hard work, and how they learned how language choices such as tone, connotation, and figurative language shape communication for different audiences. She also said that the project was framed as if the letters would be printed in the LLNRD's "In The Loup" newsletter. Here are a few excerpts:

"The Ogallala Aquifer is one of the most important water resources in the United States, and it is being rapidly depleted due to overuse and climate pressures."

– Zevan Wolf

"Fertilizer runoff occurs when excess nitrogen and phosphorous from agricultural fields wash into nearby rivers, lakes, and groundwater. Causes of this include: excess application of commercial fertilizers and animal manure on crop fields, rainfall and snowmelt washing nutrients from fields into waterways, poor nutrient management practices such as applying too much fertilizer at the wrong time or place, and the leaching of nutrients through soil into groundwater over time."

– Aubrey Winter

"Wildfires are becoming more frequent and severe across Nebraska and the United States, which poses many threats to both the ecosystem and communities. This threat has been caused by drought, climate change, and human activity."

– Payton Kniss

"Air pollution is a serious environmental problem that Nebraska faces today. It affects our health, community, agriculture, way of living, and future generations. To prevent a decline in air quality due to pollution, we can use cleaner energy sources, reduce unnecessary burning, improve fuel efficiency, and plant more trees to help improve air quality for our community and nation."

– Ethan Lobner

"One way soil erosion causes problems is by affecting our water quality. Many colleges have looked into this and noticed that when soil gets washed away, it carries dirt, chemicals, and fertilizer into rivers and lakes. This can make the water dirty and unsafe for fish and people."

– Dalton Dugan

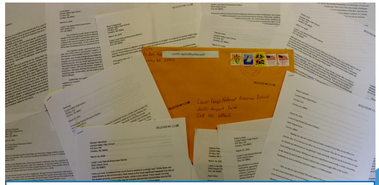
"Out of all the environmental issues in Nebraska, one of the most severe threats affecting the state is invasive plants in our habitats. These invasive plants, such as thistles, red cedars, and leafy spurge, are becoming a severe issue in our state. So if we leave these plants to take over, it will lead to lower food production, and in the cases of pastures being overrun with invasive plants there will be less grass for the cows to eat."

– Austin Dush

"Looking at the many environmental challenges Nebraska is facing right now, poor waste management, especially low recycling rates, stands out as a serious and growing problem. While it may seem like an everyday issue, the amount of waste sent to landfills continues to rise, harming the environment, increasing costs, and affecting communities across the state."

– Alandra Luby

"The letters that the Central Valley sophomore English class sent to the Lower Loup NRD dealt with a variety of environmental issues that people are facing worldwide," said LLNRD General Manager Russell Callan. "But those letters also included things like groundwater management, fertilizer runoff, soil erosion, invasive species, and other issues that the Lower Loup NRD actively works on every day. Reading those letters gave me hope, and made me believe that the world's most serious environmental challenges – including those that we face right here in Nebraska – would be more easily solved if everyone would research the issues as these Central Valley students have."



The 2025-2026 sophomore English class from Central Valley High School in Greeley researched a variety of environmental challenges and sent letters to the Lower Loup NRD describing these issues and providing suggestions on how to solve them.