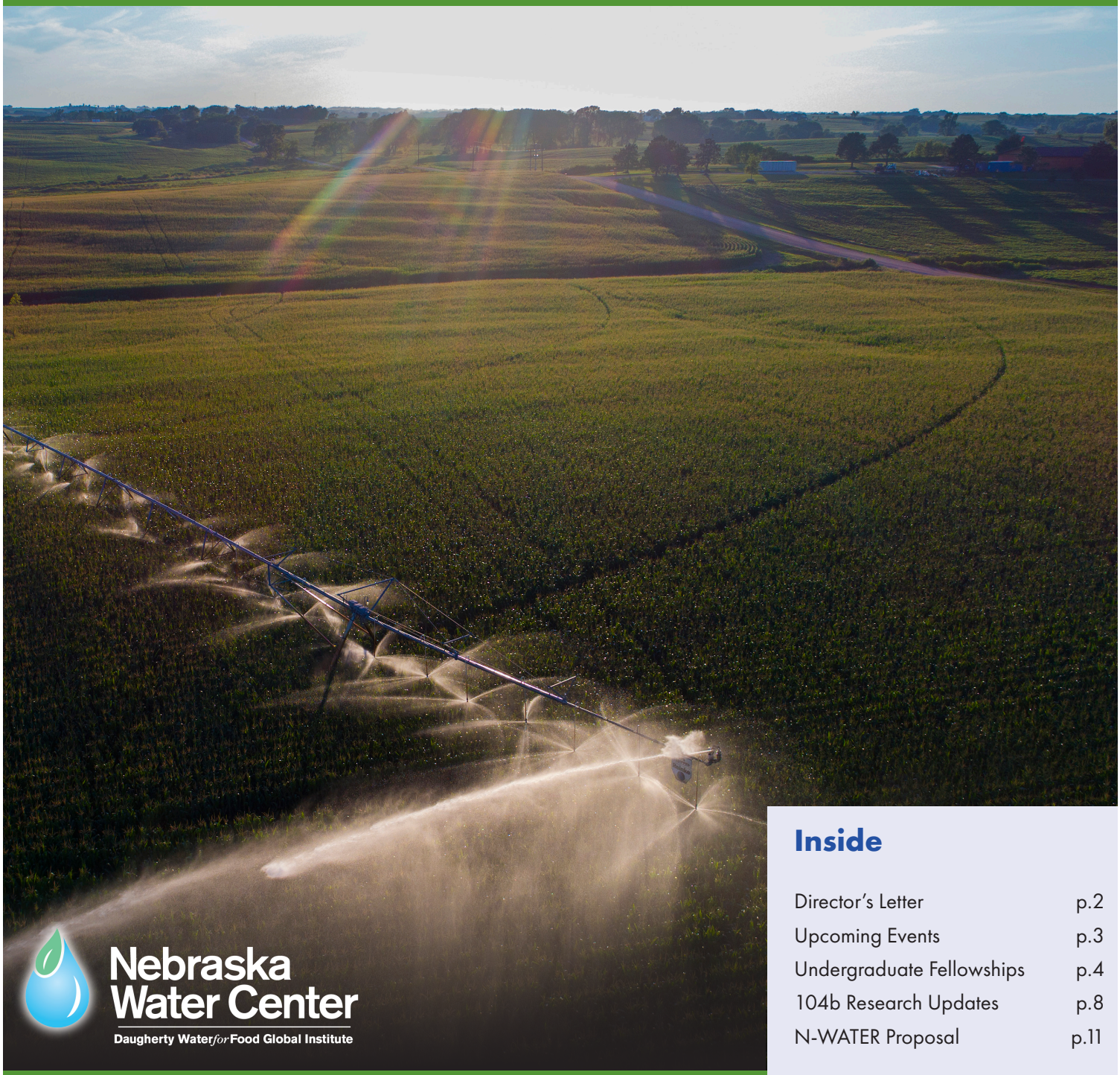
WATER CURRENT

NEBRASKA WATER CENTER
PART OF THE DAUGHERTY WATER FOR FOOD GLOBAL INSTITUTE AT THE UNIVERSITY OF NEBRASKA

SUMMER 2025

Core Research, Events, and News from the Nebraska Water Center



Center pivot irrigation northeast of Adams, Nebraska

Inside

And More!

From the Director

Chittaranjan Ray, Ph.D., P.E.

Director, Nebraska Water Center (NWC)

Dear Reader,

As we wrap up another productive summer of research and outreach, I am pleased to share this update from the Nebraska Water Center. Whether you are in the field, in the lab, or in the classroom, we hope these stories inspire and inform your work.

This summer we launched our inaugural cohort of Undergraduate Student Research Fellows. These students partnered with faculty mentors to gain research and career experience in water in Nebraska. You will find an update from the selected students as they reflect on their fellowship experience on pages 4 and 5.

Our affiliated researchers and faculty have been working hard to better understand water quality, student experience, water management, groundwater levels, and more across the state. These researchers have provided updates on their work throughout this newsletter.

In the upcoming months, the Nebraska Water Center is hosting not one but two events: the 2025 Great Plains Water Conference and our 2025 Water and Natural Resources Tour. Both events will engage partners and attendees from Nebraska and beyond. You can learn more about the conference and the tour on the following page. Agendas and registration information for both events are available on our website at watercenter.unl.edu.

At the Nebraska Water Center, we look forward to another season of discovery, connection, and continued progress. Thank you for being part of our water community.

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Fall 2025 Events at the Nebraska Water Center

2025 Great Plains Water Conference will draw participants from seven states

Join the Great Plains states as the Nebraska Water Center discusses Securing Water Resources for Tomorrow. On September 18 and 19, participants will gather on the University of Nebraska Omaha campus to provide updates on water supply and water quality throughout the region. Topics include water smart communities and watersheds, water quality monitoring and treatment strategies, emerging contaminants, wellhead protection, education and outreach, basin management, and more.

Researchers, governments, nonprofits, state agencies, and students from Nebraska, Kansas, Oklahoma, Iowa, Missouri, South Dakota, and North Dakota will share how communities across the Great Plains are planning for their future water resources.

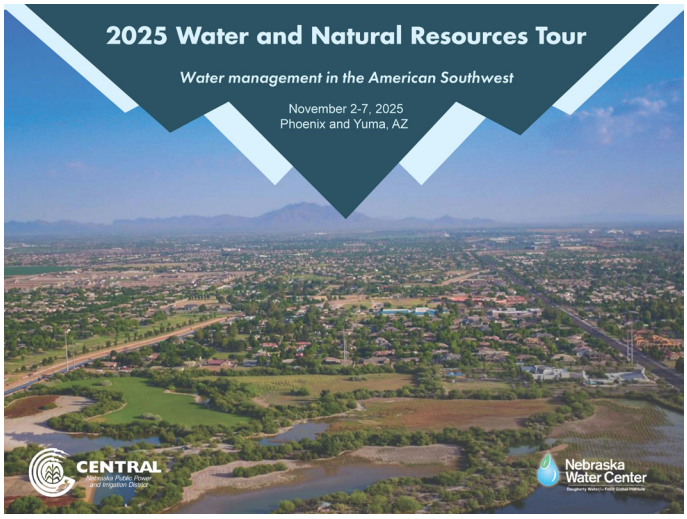
Student Research Poster Competition

Students from across the Great Plains are invited to compete in the Student Research Poster Competition. To submit your poster to compete in the student research poster competition, please register for the conference as a student. You'll be asked to provide your research poster information during registration. Interested students should review the poster competition announcement and rules prior to registration.

This event is sponsored by the Kansas Water Institute and the University of Nebraska–Lincoln's Institute of Agriculture and Natural Resources.

The draft agenda and conference details are available at **go.unl.edu/waterconference**.

Water and Natural Resources Tour ventures west to Arizona in November



Register now for the 2025 Water and Natural Resources Tour to be held November 2-7, 2025. Join the Nebraska Water Center and Central Nebraska Public Power and Irrigation District to experience urban water management, winter agriculture, and transboundary aquifer management. You'll go behind the scenes and meet the experts to get a first-hand look at water and natural resources in the American Southwest. This tour has been rescheduled from the original dates of February 2-7, 2025.

$1440 per person, single occupancy room

$1365 per person, double occupancy room

Registration will be open until September 26, 2025. Spaces are limited, so act fast to secure your seat!

The tour is sponsored by the DWFI, the University of Nebraska Institute of Agriculture and Natural Resources, HDR, Olsson, Water Futures Partnership – Nebraska, and Reinke.

The draft agenda and registration site are available at **go.unl.edu/watertour.**

Undergraduate Student Research Fellowships provide career experience in water science

As part of the mission to train future water researchers and arrange research addressing water problems and the understanding of water, the Nebraska Water Center has launched a new fellowship opportunity. Undergraduate students in Nebraska that are studying water sciences were invited to apply for the 2025 Undergraduate Student Research Fellowships to work with University of Nebraska faculty to help complete a research project leading to a publication. The Nebraska Water Center Undergraduate Student Research Fellowships are funded by the U.S. Geological Survey's 104b grant program. NWC intends to host this fellowship each year as funds allow in order to support the next generation of water scientists in Nebraska.

Three undergraduate students were selected for the 2025 fellowship cohort and have been working on research projects across campus this summer. These students have outlined their experience to share what they've learned personally and professionally.

Evelyn Reyes

Evelyn Reyes

My name is Evelyn Reyes, and I am a senior undergraduate student at the University of Nebraska-Lincoln. Currently, I am conducting research for Dr. Shannon Bartelt-Hunt specifically on Connecting Anti-Microbial Resistance Agricultural Decisions and Environmental Systems. The research consists of collecting water samples bi-weekly from four locations along Shell Creek. Then, analyzing it for different resistant bacteria. Simultaneously, we also conduct tests for microplastics through the water samples and sediment samples. These tests are done to determine the concentration level moving along the water stream.

This research fellowship program has helped me tremendously, not just educationally but also in my personal life. Not only have I received beneficial real-world skills in a research scenario, but I have also found my ability to take on rigorous and substantive pursuits. It has assisted me in determining my professional direction in my field, demonstrating how effective research can contribute to finding solutions to societal and technological issues. In the future, I see myself further researching in the field of environmental engineering and pursuing graduate studies. I would most definitely recommend any student to take advantage of this opportunity. More than research, it represents an opportunity to develop and explore the opportunities possible within your field.

Zack Hukill

Zack Hukill

My name is Zack Hukill, I am a senior biochemistry major at Doane University. Working with Dr. Chris Huber and Dr. Dan Snow, my research is centered around the speciation of arsenic in water samples collected from private wells across southeast and central Nebraska. There are two types of arsenic (As) found in water, Arsenic (III) and Arsenic (V). Both forms of arsenic are toxic, however As (III) has been known to cause cancer and is the more concerning species of arsenic. Additionally private wells are not tested regularly like the public water supply is. My research goal is to learn more about the prevalence of As (III) and As (V) in the groundwater in southeastern Nebraska while also providing these homeowners with important information regarding their water quality.

The research fellowship has provided me with experience in leading and conducting scientific research with instruments not available to me at Doane. Additionally, the research fellowship has given me experience with aspects of research that are often overlooked. One example being the logistical requirements of running research. In order to sample well water at people's homes, we needed a way for them to sign up and provide consent forms. Before the research fellowship I had no experience with this aspect of a project like this and honestly would've easily overlooked it. After this project ends, I plan to focus on my senior research project at Doane. That project is very similar to this one but instead involves the speciation of mercury in fish caught in lakes in central and southeast Nebraska. The experience I have gained in the research fellowship program makes me very excited and confident in both the arsenic project and in my future senior research. I would tell anyone thinking about applying for the next fellowship opportunity to absolutely do it, because gaining experience as valuable as this is extremely difficult in a normal classroom setting and is crucial for entering the professional world.

Chase Lewandowski


Chase Lewandowski

My name is Chase Lewandowski. I am going to be a junior at the University of Nebraska-Lincoln, double majoring in plant biology and microbiology in the College of Agricultural Science and Natural Resources. My research this summer focuses on investigating the impact of the groundwater microbial community on surface soils. In Nebraska, groundwater serves as a primary irrigation source for many agricultural producers. However, little is known about the subsurface viral and bacterial implications on soil microbial ecology. In this project, we are identifying members of the microbial communities in the groundwater and soil over the irrigation season to determine the contributions of groundwater to the soil microbial community. The faculty member I am working with is Dr. Karrie Weber, Professor in the School of Biological Sciences and Department of Earth and Atmospheric Sciences, who has been very helpful in assisting me with methods and data analysis.

I have learned a great deal since I began this experience. From developing personal skills, like lab practices and organization, to professional skills, this lab has been a great example of what is expected from a professional researcher. I feel much more comfortable communicating scientifically with my peers and colleagues, thanks to this experience. This has had a very positive impact on my college experience. I get to work with other researchers who are interested in the same topic as I am and watch how they approach a project. It's a great example of what I need to learn to do in the future if I am to be a researcher. I plan to continue my research throughout the year by analyzing different aspects of the microbiome found in groundwater and soil. My advice for a fellow undergraduate pursuing this opportunity is to have patience. It can be discouraging to hear a bunch of buzzwords in a conversation and constantly feel lost because of it; however, you learn as you go. By the end of the summer, you will have a much better grasp of the research process, its intricacies, and the skills needed to be successful in the field. In conclusion, I had a great time this summer working with Dr. Weber. I have grown both professionally and personally as a direct result of this experience, and I am thankful for the opportunity to participate.

Nebraska Water Center holds mini Nebraska Water Tour

By Ann Briggs, Communications and Program Specialist

In May, the Nebraska Water Center hosted a one-day water tour as part of the 2025 Water for Food Global Conference. This tour invited local participants and international visitors to experience water management in eastern Nebraska and learn about the state's Natural Resources Districts, the Nebraska Extension program, and local farming operations.

The tour kicked off by visiting two farm operations in eastern Nebraska. One operation showcased subsurface drip irrigation and discussed different methods of irrigation and water management in eastern Nebraska based on aquifer availabity. The second operation was a participant in UNL's Highboy Cover Crop Interseeding Project, which demonstrates the effectiveness of broadcast interseeding cover crops before harvesting corn. These operations gave local and international attendees insight into the unique water management required in eastern Nebraska.


Producer Burdette Piening spoke to the tour group about his operation's subsurface drip irrigation system.

The one-day water tour also visited Lake Wanahoo where participants learned about Nebraska's Natural Resources Districts, watershed management, and water quality monitoring from the Lower Platte North Natural Resources District team.

Finally, the tour stopped at the Eastern Nebraska Research, Extension, and Education Center (ENREEC) to get an overview of their current projects. Attendees were able to get in the field and experience ENREEC's work in using technology for crop phenotyping, monitoring the exchange of gases between crops and the environment, and nitrogen management.

Know Your Well workshop trains educators and regional leaders

By Ann Briggs, Communications and Program Specialist

The Know Your Well team held a workshop on June 12 at the Central Platte Natural Resources District Office in Grand Island to provide professional development for educators and regional leaders. The goal of this workshop was to update partners on curriculum development, introduce teachers to their corresponding groundwater protection program partners, and do a hands-on demonstration of well testing.

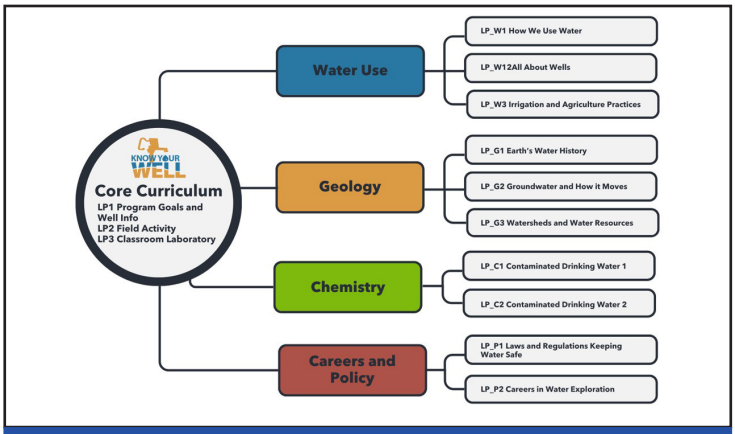
Lesson plans available for classroom use

The Know Your Well curriculum developers provided an overview of the lesson plans that are currently available. Existing lesson plans include water use, geology, chemistry, and water related careers and policy. The goal of the lesson plans is to make it easy for teachers in Nebraska and beyond to implement Know Your Well in their classrooms. They also aim to showcase the impact of water science on local communities while aligning with Nebraska state standards for science education.

These lesson plans were piloted in three schools across the state in the 2024-2025 school year and have been adapted with feedback from those test teachers and classrooms. The current lesson plans are available at **go.unl.edu/KYWresources**.

Know Your Well intern Julia Ramsay (center) shows workshop participants how to collect well water samples.

An overarching goal of the Know Your Well program is to empower high school students to interact with members of their community and practice talking about water quality and water science with people they don't know. To facilitate this goal, the Know Your Well team outlined best practices, talking points, and requirements for interacting with well owners before, during, and after the testing process. By utilizing these guidelines alongside the classroom-ready curriculum, teachers have support to implement Know Your Well in their community. This is achieved by following a streamlined process for both class work and field work. Combining these resources also gives students support to successfully participate in the full Know Your Well process, from identifying wells to be tested and getting property owner permission to testing the water samples and reporting results to the property owner and the community.



The Know Your Well classroom curriculum includes lesson plans in water use, geology, chemistry, and water careers and policy.

Hands-on demonstrations

Collecting well water samples and testing them in a classroom setting is often a new experience for both Know Your Well educators and students. To provide a better understanding of the process, Know Your Well graduate student Sara Brock-Contreras and Know Your Well intern Julia Ramsey facilitated hands-on demonstrations for workshop attendees. Participants were able to collect samples from an on-site well at the Central Platte Natural Resources District office and test the samples themselves to gain a better understanding of the process.

"Because water is interdisciplinary, teachers approach this program from a variety of backgrounds." Sara Brock-Contreras shared. "We offer hands-on training, multimedia instructional materials, and direct lines of communication to the Know Your Well team and local water quality experts so that teachers can confidently help their students do science in the field and classroom."

Workshop participants were also able to test run the updated Know Your Well app, which is used to collect well data in the field. The updated app is more user friendly. Workshop participants benefited from experiencing the full data collection and testing cycle, including inputting the data into the app.

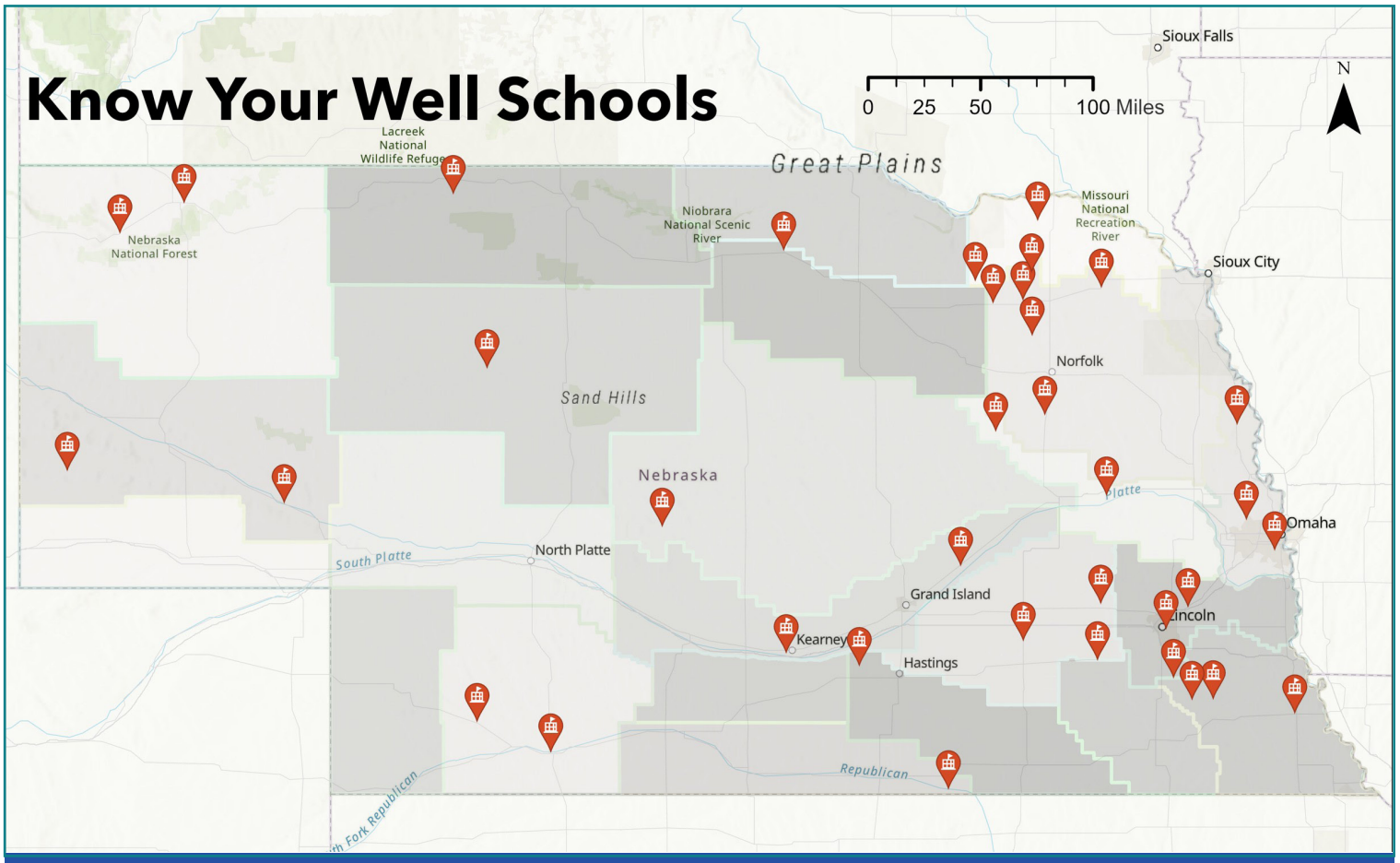
Clarifying program structure

The June 12 workshop wrapped up with an explanation of how different Know Your Well partners work together to implement the program. Different portions of the program are managed by regional leaders, classroom teachers, Water Sciences Lab staff, and other partners. In order to ensure smooth coordination of the program across the state, these partners were introduced to each other during the workshop.

Next steps for Know Your Well

Testing of the Know Your Well curriculum will continue throughout the 2025-2026 academic year. This testing is part of an EPA Environmental Education grant, which has been extended through the summer of 2026. The Know Your Well team will also be demonstrating the curriculum, app, and other program resources at the 2025 Great Plains Water Conference in September.

Know Your Well is a youth-driven education and outreach program designed to train high school students to sample and test domestic well water quality, as well as evaluate factors leading to groundwater contamination. Since starting in 2017, the project has involved approximately 600 students from 37 schools. Approximately 400 wells across the state have been tested, including several that have never been tested before.



37 schools across Nebraska have participated in Know Your Well since the program began in 2017.

Updates from the 2024 104b award winners

By Ann Briggs, Communications and Program Specialist

Each year, the Nebraska Water Center provides grant funding for research through the U.S. Geological Survey's 104b program. 104b awards are geared towards early-career faculty who are conducting research in Nebraska that has unique applications both within and outside of the state. In 2024, a total of $75,249 was awarded. We sat down with the four awardees to catch up on how their research is going.

Project title: Growing Groundwater Science – Doane University

PIs: Chris Huber, co-PI Daniel Snow

Funding amount: $11,358

Project summary: Groundwater is the primary source of drinking water for most Nebraskans, especially from domestic wells in rural areas, and over 20% of Nebraskans rely on drinking water from private wells. Nebraska's abundant groundwater is vulnerable to contamination by agricultural and natural geogenic contaminants that may impact well water quality and affect human health. Few of these domestic wells are tested on a regular basis. Increased systematic collection and analysis of water quality data from domestic wells is a promising way to monitor groundwater quality. This project will train undergraduate students at Doane University in well water sampling and testing and introduce them to methods for advanced chemical analysis of geogenic contaminants such as arsenic and atrazine. High school students at a local school will also be trained to collect and test samples using portable test kits and screen well water for coliform bacteria, nitrate and geogenic contaminants that affect groundwater quality worldwide. Educating youth about domestic well vulnerability and solutions through hands-on interactive data collection and learning provides an opportunity to inform all Nebraskans about the value of our groundwater.

Update from Chris Huber

Over the course of our 104b grant we were able to collect water samples from 43 domestic wells across Cass, Gage, Lancaster, Saline, Douglas, Seward, York, Saunders, and Filmore counties. Using the IC-ICP/MS instrument at the Water Sciences Lab, we were able to quantify the amounts of As (III) and As (V) species in those water samples. We found that 23 (53.5%) of the samples had detectable amounts of As (III) and 41 (95.3%) of the samples had detectable amounts of As (V) in them. The median amount of As in the 43 wells was 2.7 ppb and five (11.6%) of the wells had As levels above the 10.0 ppb EPA acceptable limit. With the remaining time left in the funding cycle, we hope to collect data on 15-25 additional wells across southeast Nebraska.

Through this grant we have gained significant experience working at the Water Sciences Lab, specifically with the IC-ICP/MS which will make future studies requiring the quantification of heavy metals more accessible for Doane students in the future. The study funded by the 104b grant has been among the more rewarding research studies that I have been involved with. The response from the communities of southeast Nebraska has been really positive and has motivated us to seek out additional funding sources to continue to study arsenic species in domestic wells moving forward. We hope to publish our findings over the next year which should hopefully make us more competitive for funding opportunities in the future.

Project title: Grassroots Conservation: Engaging Communities in WaterSmart Lawn Care Practices

PIs: Wei-zhen Liang and Xin Qiao

Funding amount: $19,374

Project summary: The "Grassroots Conservation" project in Nebraska aims to develop an affordable soil moisture sensing system and online platform to encourage sustainable lawn irrigation practices. This initiative integrates community education and student involvement, promoting water-efficient practices and real-time soil moisture monitoring. Expected outcomes include enhanced water conservation, improved lawn management practices, and fostering a generation of informed citizens, students, and professionals equipped to tackle the challenges of sustainable water use.

Update from Wei-zhen Liang

We have recruited 10 homeowners in Gering and Scottsbluff and deployed 14 sensors across their lawns. Early results demonstrate clear patterns: soil moisture readings spike immediately after irrigation and decline as the grass consumes water, validating the sensors' ability to capture lawn water use cycles.

Our educational component has also been active. We conducted two workshops in Nebraska and Florida. During the sessions, students learned the basics of how Internet of Things (IoT) can be used in agriculture, especially for monitoring soil moisture and crop health.

We aim to leverage this pilot project to pursue larger proposals, including potential funding through the Nebraska Environmental Trust and NSF-ExLENT, while also seeking collaborations with extension educators and community partners.

The 104b seed grant has been critical in helping us launch this project, and it has enabled the development of our prototype systems, student experiential learning opportunities, and homeowner engagement. This foundation will support future competitive proposals and expand research on smart lawn irrigation management.

A homeowner working with Western Nebraska Community College students to install a soil moisture sensor in his lawn as part of Liang and Qiao's 104b project.

Project title: Monitoring monthly groundwater level variation in the Nebraska Sandhills using remote sensing

PIs: Nawaraj Shrestha, co-PIs Troy Gilmore, Aaron Mittelstet, Aaron Young, R.M. Joeckel

Funding amount: $14,716

Project summary: Groundwater levels in remote areas are measured using few observation wells, limiting understanding of variability and hindering decisions. High installation, maintenance, and monitoring costs restrict observations. Yet, tracking groundwater variation is critical because these areas recharge aquifers and are vulnerable to human and climate impacts. Satellite remote sensing, such as LiDAR, can estimate water levels. Where surface water and groundwater intersect, LiDAR provides estimated aquifer hydraulic heads. This study tests LiDAR's ability to estimate monthly hydraulic heads of the unconfined aquifer in the Nebraska Sandhills using lake levels, enabling spatial and temporal groundwater monitoring at a monthly scale.

Update from Nawaraj Shrestha

Recent research demonstrates that LiDAR-derived groundwater-level estimates show strong agreement with well data, particularly when compared to the nearest observation wells. By incorporating satellite altimetry datasets, the study enhances spatial observation density across the Sandhills region. The proposed framework successfully generates spatially continuous groundwater-level maps, offering vital insights into the Sandhills' sensitivity to climate variability and its pivotal function in regional groundwater recharge.

104(b) grants have been critical as it has been instrumental in providing first-time PI experience. Leading a project has built confidence, capability, and momentum for federal and institutional funding. It also helped in career development, networking & mentorship opportunities through collaboration, and conference presentation and participation.

Project title: Is fish tissue methylmercury related to lake sediment methylmercury?

PIs: Chad Brassil, co-PIs Karrie Weber and Matthew Larrey

Funding amount: $29,801

Project summary: Mercury is a highly toxic metal to which humans are exposed primarily through consumption of wild-caught fish. Because of its chemical properties, mercury movement through the environment and within ecosystems is complex. In other parts of the United States (Rocky Mountains, Northeast and Southeast U.S.), the relationship between mercury in sediment and fish has either been tenuous or contingent on locally specific environmental factors.

We will quantify one part of the complex movements of mercury in the environment in the Western Corn Belt by comparing sediment mercury to lake parameters, sediment mercury to mercury to fish tissue mercury in the same lakes, and describing the makeup of sediment microbial populations with genetics. Our results will clarify how mercury moves from the sediment into aquatic food webs as a part of a larger effort to inform wild fish consumption decisions.

Podcast episode explores critical indicator for Nebraska groundwater quality

By Frances Hayes, DWFI Director of Communications and Public Relations

The vadose zone is the area between crop roots and the water table, and is a critically important region for storage, transport and transformation of chemicals that can impact groundwater quality. In the August episode of the Water for Food Podcast, host Frances Hayes talks with Arindam Malakar, a researcher with the Nebraska Water Center who studies Nebraska's vadose zone and monitors the impacts of irrigation and fertilizer on groundwater. The podcast is available at **waterforfood.nebraska.edu/podcast**.

Hayes is also joined by Marie Krausnick, assistant general manager for Nebraska's Upper Big Blue Natural Resources District (NRD). The Upper Big Blue NRD and other NRDs across the state have partnered with the University of Nebraska-Lincoln and the Nebraska Water Center in researching nitrate concentration in their districts. While nitrate levels in some areas have decreased in the Upper Big Blue NRD, there has been an overall increase of 54% in the district.

In Nebraska, as in many parts of the world, one of the key chemicals monitored in the vadose zone is nitrate. Nitrogen is a critical plant nutrient, but once it sinks below the roots and enters the vadose zone, it becomes a liability: both an economic loss for the farmer and a potential public health risk for some rural communities where wells have not been recently tested. Excess nitrate in drinking water can cause adverse health effects, particularly in infants and vulnerable populations, as too much nitrate in the body makes it harder for red blood cells to carry oxygen. Contaminants, like nitrates, present in the vadose zone can eventually appear in the underlying aquifers. NWC takes soil cores all the way down to the groundwater table, sometimes over 100 feet, and tests them for nitrate and other contaminants. These cores are crucial for understanding how water and chemicals move through the soil and potentially reach groundwater. They can also be useful in predicting water quality issues. The Nebraska Water Center Water Sciences Lab has collected vadose cores for decades. To increase the usability of all this data, they launched the Nebraska Vadose Zone Program online portal in 2015 with funding from the Nebraska Environmental Trust, Nebraska Department of Environment and Energy (now the Nebraska Department of Water, Energy, and Environment), and several Natural Resources Districts (NRDs).

New methods for microcontaminant measurement funded by 104b and NSF

By Ann Briggs, Communications and Program Specialist

A research collaboration between UNL's Department of Chemistry and the Water Sciences Laboratory is making strides in water research. Thanks to seed funding from a 104b grant awarded by the Nebraska Water Center in 2013, and continued support from the National Science Foundation (NSF), researchers are developing powerful new tools to better understand how human-made chemicals interact with the environment.

Led by Professor David Hage from UNL's Department of Chemistry and Daniel Snow, Director of the Water Sciences Laboratory, the project—Ultrafast Affinity Extraction: Fundamental Studies and Use in Environmental Applications—is changing the way scientists and resource managers consider microcontaminants in water.

Novel Technology for a Modern Challenge

The research team is focused on creating and testing new methods to measure and study microcontaminants—tiny amounts of chemicals like pharmaceuticals, pesticides, and nanoplastics—that can affect water quality and environmental health. These contaminants often bind to natural substances in water, such as humic acid, a type of dissolved organic matter. But until now, scientists didn't know much about how strong this binding was or how it affected the movement and activity of pollutants.

"No one else is doing such work at this level," said Professor Hage. "It's important for anyone working on water quality who is interested in microcontaminants, pesticides, nanoplastics, and more, as it gives us a fundamental understanding of the active forms and binding behavior of these contaminants in the environment."

To study these interactions, the team uses small flow-through columns and instruments for chemical separations—providing fast tests that allow researchers to run many trials quickly with a selected form of humic acid or contaminant. These experiments start with prepared samples that have a known level of the contaminant or humic acid to calibrate the experiment. Researchers then compare those results to samples with known levels of both humic acid and microcontaminants, such as simulated environmental mixtures or water samples collected by the Water Sciences Lab. As the test protocol and models continue to improve, researchers and resource managers throughout the state will be able to examine and test their water samples using this method to better understand the activity and behavior of microcontaminants in the systems they are studying.

"This research provides a new set of tools that can give more specific answers to some water quality questions that rely on knowledge of the activity and forms of these pollutants," Hage explained. "So it should be helpful for resource managers in their work to examine and address the environmental effects of different types of contaminants."

Applications for Water Managers in Nebraska

The methods of chemical and water analysis being developed have wide-reaching applications. They can help scientists and water managers understand how contaminants move through water systems, how they interact with natural materials, and what levels might be biologically active or harmful.

This is especially important in Nebraska, where agriculture, industry, and urban development all play a role in water quality. By improving the ability to detect and study contaminants, this research supports better decision-making and more effective environmental protection.

The team's work also includes modeling how contaminants behave in water and in creating new tools for chemical separation and analysis of these pollutants. These tools are based on the use of microscale columns and ultrafast affinity extraction, a technique that allows scientists to quickly study weak-to-moderate chemical interactions that were previously hard to measure and characterize.

Student Success and Future Impact

Beyond its scientific contributions, the project has also led to impressive student achievements. Graduate student Sadia Sharmeen won Best Poster in Physical Sciences at the UNL 2025 Student Research Fair and received one of the Chemistry Department's 2025 Graduate Research Assistant awards. Another student, Harshana Olupathage, earned Best Poster at the 2024 International Symposium on High Performance Liquid Phase Separations and Related Techniques.

These successes highlight the project's role in training the next generation of scientists. Students working with Dr. Hage and Dr. Snow gain hands-on experience in chemical analysis, environmental science, and cutting-edge research methods.

The team has developed a short course in analytical chemistry to share these and related techniques more broadly, including through a graduate certificate program.

Looking Ahead

With a second round of NSF funding renewed last year and a major instrumentation grant awarded to this and related projects in the Department of Chemistry, the future of this research looks bright. The team continues to refine their methods and explore new applications, including the study of nanoplastics and other emerging contaminants.

By combining innovative technology with real-world environmental challenges, this project helps Nebraska better understand and protect its water resources.

Graduate Student BK Sajeeb studying pharmaceutical binding with carrier agents found in the environment.

Research team aims to position Nebraska as a leader in groundwater quality

By Karrie Weber, NWC Researcher, and Karina Schoengold, NWC Associate Director

A team of Nebraska researchers, led by Karrie Weber and Karina Schoengold, has submitted a proposal to the National Science Foundation's *Established Program to Stimulate Competitive Research – Research Infrastructure for Science and Engineering (E-RISE)* program. The project, titled **E-RISE: Nitrogen in Water, Agriculture, Technology, and Environmental Research (N-WATER) Accelerator**, aims to position Nebraska as a global leader in groundwater quality research and solutions. The proposal will undergo a national competitive review process with a decision expected in early 2026.

At the core of the N-WATER Accelerator is the creation of a digital twin of Nebraska's subsurface and groundwater resources—a virtual model that uses high-resolution, real-time data to simulate, monitor, and predict nitrogen movement and transformation below the Earth's surface. This groundbreaking tool will help scientists, policymakers, and community partners develop smarter strategies to protect water quality, balance agricultural productivity, and safeguard public health.

The N-WATER Accelerator will provide tools to better predict nitrogen movement through the system in response to design solutions that ensure sustainable water use for generations to come.

The proposal brings together the University of Nebraska–Lincoln, University of Nebraska at Omaha, Doane University, Chadron State College, and Western Nebraska Community College, in partnership with the Nebraska Water Center, Hastings Utilities, Ethos Connected, and several Natural Resources Districts. This coalition will establish a lasting integrated research and education ecosystem across the state of Nebraska that continues well beyond the NSF funding period.

N-WATER's vision is one that is both local and global. By tackling Nebraska's water challenges with innovative science and technology, N-WATER will develop tools that can be applied nationally and globally.

The N-WATER Accelerator proposal reflects Nebraska's long-standing commitment to excellence in water research and its leadership role in addressing the intersection of agriculture, environment, and technology.

NWC intern begins career in Nebraska Extension

By Ann Briggs, Communications and Program Specialist, and Deann Gayman, University Communications and Marketing

Kristen Herrick worked as an NWC communications intern during her senior year at UNL. After graduating from the University of Nebraska – Lincoln with a bachelor's degree in agricultural and environmental sciences communication in May, Kristen has started her career at the Nebraska Extension office in Otoe County as a 4-H Extension Assistant. Kristen's experience in 4-H was highlighted by Nebraska Today, with an excerpt of that story below.

Kristen Herrick worked as an NWC Communications Intern before beginning her career with Nebraska Extension this summer.

Kristen Herrick can't remember a time during her childhood when she wasn't involved in 4-H.

As the daughter of a Nebraska Extension educator, Herrick was learning through 4-H long before she was old enough to be a full-fledged member.

"Because my mom, Rhonda Herrick, was an educator in Franklin and Kearney counties, I was going to contests, workshops, county fairs everything to do with 4-H — since I was little," Herrick said. "I feel like I got a really full picture of what it takes to help young people find success and have a successful 4-H program."

Eventually, Herrick did get to forge her own 4-H path, which she credits with developing her leadership and communication skills. Herrick is carrying those skills and everything she's soaked up from her mom into her career. She is the newest 4-H assistant for Nebraska Extension in Otoe County and is excited to help guide the program. Herrick began the role in May, shortly after graduating from the University of Nebraska–Lincoln with a bachelor's degree in agricultural and environmental sciences communication.

Starting a job as a 4-H assistant in May means jumping in head-first and learning the ropes quickly. Many 4-H contests, activities and fairs happen during the summer months. Herrick quickly got to work leading preparations for livestock entries in the Otoe County Fair in Syracuse, Nebraska, Aug. 1-3. In four hours on entry day July 31, Herrick oversaw the weigh-ins of 952 animal science entries from 316 exhibitors. In total, Otoe County Fair officials handled 4,093 entries from 4-Hers.

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