WATER CURRENT

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

FALL 2025

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

Lee Ann Stover (left) uses the Know Your Well curriculum in her classroom at Westview High School in Omaha

Inside

And More!

From the Director

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

Director, Nebraska Water Center (NWC)

Dear Reader,

2025 is coming to an end and we have just one more newsletter to share with you this year. The last few months have been very fruitful for our team and I am glad to report updates on our research and outreach throughout the state.

In September, we hosted our annual water conference at the University of Nebraska Omaha campus in collaboration with the Water Centers throughout the Great Plains. It was a pleasure to learn more about the work other states are doing to manage their water resources for the future, and to collaborate closely with our counterparts in other states. We received good feedback from speakers and attendees on the value of looking at water challenges and solutions at the regional scale and will consider future opportunities for regional research and events.

In this newsletter, we are glad to share with you updates from several outreach and engagement opportunities our staff and researchers have been involved in through the past several months. From research field days (pages 8 and 11) to being invited speakers at conferences and events (pages 9 and 10), our team has been working hard to connect partners and stakeholders with information and resources regarding water in Nebraska.

Our team has been looking for opportunities to promote research and use our network to assist partners throughout the state. To this end, we will be hosting monthly virtual research office hours. We invite researchers and partners to drop in during our online office hours to share their research ideas or questions and our team will help make connections for partnerships and funding opportunities. More details about the virtual office hours can be found on Page 5 of this newsletter, and dates for 2026 will be announced on our website soon.

As the year draws to a close, I am grateful for the partnerships and process we have shared across Nebraska this year. I hope to see many of you at our upcoming virtual office hours and 2026 events. The Nebraska Water Center wishes you a restorative autumn and a strong start to 2026.

Chittaranjan Ray

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2025 Great Plains Water Conference hosted in Omaha

By Ann Briggs, Communications and Program Specialist

The Nebraska Water Center hosted the 2025 Great Plains Water Conference on September 18 and 19. Held at the Milo Bail Student Center on the University of Nebraska Omaha's campus, this regional event included 61 speakers and 163 attendees from eight states across the region.

The conference theme was Securing Water Resources for Tomorrow, and speakers shared their expertise in 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 shared how communities across the Great Plains are planning for their future water resources.

Students from across the Great Plains competed in the Student Research Poster Competition to share their work and gain skills in public speaking and networking. The following students were awarded prizes for their presentations.

First place: Dilli Ram Bhattarai, Rita Khadka, and Ladya Spor Leal. University of Nebraska – Lincoln, poster titled "*Conservation Reserve Program and Hydrology in the Northern High Plains: An Integrated Model of Economic, Land-Use, and Hydrological Dynamics*"

Second place: Kalynn Meyer, University of Nebraska – Lincoln, poster titled "*Real-Time In-Season Variable Rate Corn Fertilizer Application Using Canopy Sensors and UAVs*"

Third place: Kalley Collins, University of Nebraska – Lincoln, poster titled "*Monitoring lysimeter pore water samples in agricultural soils to quantify carbon dioxide removal of an enhanced rock weathering project deployed in Nebraska*"

Fourth place: Deepak Verma, Indian Institute of Technology Roorkee, poster titled "*Monitoring Seasonal and Long-Term Structural Dynamics of Shasta Gravity Dam Using InSAR Data and Methods*"

Fifth place: Evelyn Reyes, University of Nebraska – Lincoln, poster titled "*Seasonal Variation and Co-Occurrence of Microplastics and Antibiotics in an Agricultural Watershed*"

Videos from many of the sessions and photos from the event are available at **go.unl.edu/waterconference**. The event was sponsored by the Kansas Water Institute and the University of Nebraska – Lincoln's Institute of Agriculture and Natural Resources.

Nebraska Water Center staff and the winning student poster presenters.
Photo credit: Kansas Water Institute

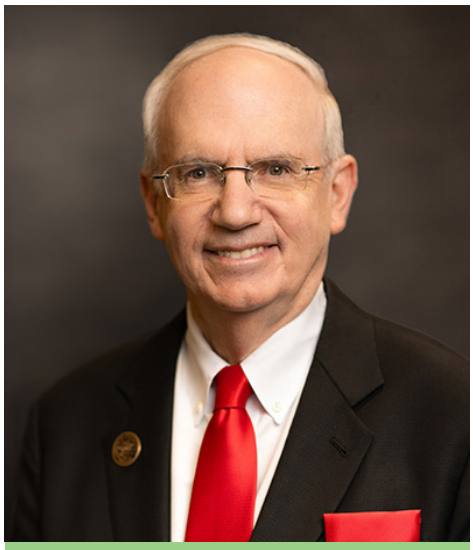
Water Centers from each state shared their work during the opening session.
Photo credit: Kansas Water Institute

The conference included networking opportunities.
Photo credit: Kansas Water Institute

Water science partnerships strengthen state's ag and environment

Op-ed by Dr. Jeffrey P. Gold, University of Nebraska President

Every Nebraskan knows the value of water. It sustains our communities, nourishes our farms and is key for our economic prosperity. Protecting it isn't just good practice — it's our shared responsibility for Nebraska's future.



Dr. Jeffrey P. Gold, NU President

That's why the University of Nebraska, as part of its land-grant mission, is so deeply engaged in water research, education and outreach. Through the Nebraska Water Center, our faculty and students are working alongside producers, natural resources districts, businesses, scientists and communities to ensure that every drop is used wisely.

The Water Center, part of NU's Daugherty Water for Food Global Institute, pursues wide-ranging work that has major benefits for Nebraska: lower agricultural input costs, stronger yields, healthier land and cleaner water for generations to come. Producers partner with us on new strategies for irrigation efficiency. Students receive our training to test wells in rural communities. NU scientists track how water moves through soil and how components travel underground, then work with NRDs on water management strategies.

Each effort points toward the same goal — helping Nebraskans better understand our state's water conditions and make informed decisions about this vital resource.

The Water Sciences Laboratory in Lincoln is at the heart of this mission. There, scientists analyze thousands of samples every year for a wide range of water-related components and indicators, providing advanced testing that scientists, producers and resource managers depend on.

Marie Krausnick, assistant general manager for the Upper Big Blue Natural Resources District, notes that her NRD's collaborative work with NU allows researchers to talk with farmers and find answers about how much nitrate is getting into the water and how long the water takes to travel through the area. These NU partnerships strengthen our crop production and our producers' bottom line at the same time they enhance Nebraska water quality.

And the work doesn't stop there. From monitoring toxic algal blooms in our state's recreational lakes to studying the ties between groundwater and the Platte River, our Water Sciences Laboratory is tackling challenges that affect us all. The collaborative solutions developed here ripple outward — strengthening communities, protecting ecosystems, and ensuring Nebraska agriculture remains productive for the future.

In all, the laboratory "provides Nebraska producers and water resource managers with advanced technology and solutions to help maintain our state's most strategic natural resource," explains Daniel Snow, research professor and director of laboratory services for the Nebraska Water Center.

The Water Sciences Laboratory provides advanced testing for scientists, producers, and resource managers across the state.

Master Irrigator provides opportunities for farmers to interact with industry leaders and learn about water management and irrigation technology.

Collaboration with Nebraska producers is a central part of the Water Center's work, and the Master Irrigator program, launched this year, stands as a prime example. In response to producer needs, the program is opening up more opportunities for farmers to interact with peers and industry leaders on the latest advances in water management and irrigation technology.

A series of regional Master Irrigator events this winter will help participants connect with industry leaders and hear takeaways from growers who competed in our annual Testing Ag Performance competition.

"We want growers to drive the creation of the Nebraska Master Irrigator Program so it meets their needs," says Crystal Powers, Nebraska Extension educator and coordinator for the program.

The Water Center's outreach work also includes the Know Your Well program, begun with a 2016 grant from the Nebraska Environmental Trust. Now supported by multiple funding sources and partnering with Nebraska NRDs, the program trains high school students from 37 schools across Nebraska to sample, test and evaluate vulnerability to contamination of over 500 domestic wells. The Water Sciences Laboratory provides comprehensive test results to well owners who can decide if their well water meets health standards.

Julie Wragge, grant coordinator with the Lower Elkhorn NRD, has been directly involved with the program since 2022 and salutes its value. "This hands-on learning curriculum promotes critical thinking and leadership skills that can stay with a person for life, educating future generations in the process," she says.

At the University of Nebraska, we pledge to continue supporting these partnerships, innovations and conversations that keep Nebraska thriving.

Working together, we can ensure that the next generation inherits not just our land, but the clean, abundant water that makes it flourish.

Nebraska Water Center to hold virtual office hours for research development

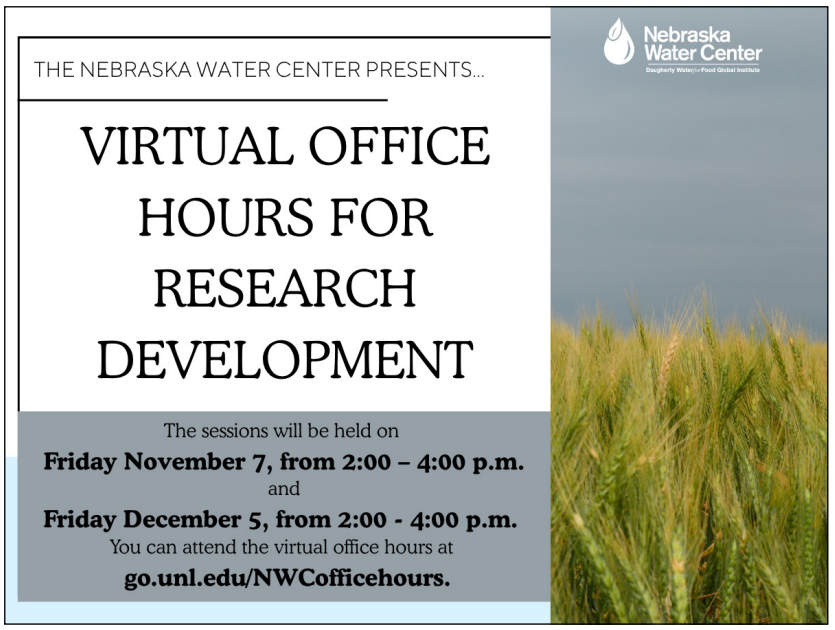
By Ann Briggs, Communications and Program Specialist

This fall, the Nebraska Water Center will hold two virtual office hours sessions. The purpose of the virtual office hours is to facilitate research development and build connections between researchers and stakeholders throughout the state. We invite researchers and partners to share their ideas with our team so we can provide assistance in working through the proposal details and finding opportunities for funding and partners.

We encourage attendance from stakeholders who are looking for University partnerships to conduct water research, researchers who are looking for support in finding funding opportunities, and partners throughout the state and region who are interested in being more engaged in water research in Nebraska.

This fall, virtual office hours will be held on Friday, November 7, from 2:00 – 4:00 p.m. and Friday, December 5, from 2:00 – 4:00 p.m. Monthly sessions are planned for 2026, and dates will be announced soon.

You can attend the virtual office hours at **go.unl.edu/NWCofficehours**.



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Common nusiance: iron, hardness, sulfur, sediment

Where to get water tested

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Screening: home kits, NRD testing, participatory science

Certified labs: provide precise results and wider options

Treatment options

Scan

Determined by what needs removal. May need multiple: reverse osmosis (RO), distillation, carbon, water softener, UV, etc.

This document has been peer reviewed.

In Nebraska, groundwater belongs to the public. Every Nebraskan has a role to play in ensuring our future abundant, safe drinking water.

Scan

Home

From home water & wastewater, lawn & landscape, to urban agriculture. Scan the link to explore UNL resources to inspire ideas you can implement.

Scan

Farms and Ranches

Irrigation, fertilizer and agrichemical management, soil health, conservation practices, and more. Scan the link to explore innovative, research-backed options for your operation.

Nebraska Natural Resources Districts

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State of Nebraska

Dept. of Water, Energy & Environment

Enacts state legislation and responsibilities of the Clean & Safe Drinking Water Acts, such as planning, facility permitting, and surface water monitoring. Regulates well construction and licensing well contractors.

Clean & Safe Water Acts

U.S. Environmental Protection Agency

Federal legislation passed in 1972/4 (amended since). Provides federal funding for local water quality projects. Regulates public drinking water through national health-based standards. Requires state implementation.

U.S. Dept. of Agriculture NRCS

Natural Resources Conservation Service

Provides funding and design for farm and ranch water protection projects.

In addition, many more contribute: private industry, licensed/certified water and wastewater professionals, tribal nations, cities, counties, other state and federal agencies, and a wide array of non-profit organizations.

PROTECTING NEBRASKA'S WATER

EXTENSION

Starts with **YOU**

Nebraska Water Center

Biochar field day showcased Nebraska research, redcedar management

By Fran tenBernsel Benne, Department of Agronomy and Horticulture Communications Specialist

Nebraska researcher Michael Kaiser has been studying how converting removed eastern redcedar into biochar provides a dual benefit — controlling eastern redcedar encroachment while creating a valuable soil amendment.

“When added to soil, biochar improves water and nutrient retention and increases organic carbon content, enhancing soil health,” said Kaiser, an associate professor of agronomy and horticulture. “All these agronomic benefits are relevant for long-term, sustainable crop productivity in corn-soybean systems.”

Eastern redcedar, an invasive/aggressive species, disrupts native grassland ecosystems, decreases forage availability and raises wildfire risks — particularly near urban areas.

“So why not use this unwanted biomass to produce biochar — a multipurpose material?” Kaiser said.

Biochar is a carbon-rich, porous material made through pyrolysis, a process that heats organic matter in a low-oxygen environment. Research at the University of Nebraska–Lincoln shows biochar can improve soil structure, increase crop yields, reduce organic waste and help prevent groundwater pollution — and it isn’t just for agricultural soil.

“It can be used in urban settings, such as yards and vegetable gardens,” Kaiser said. “Research at Nebraska also shows biochar’s benefits for concrete and as a filtration medium.”

In spring 2024, the Nebraska Biochar Initiative was launched to promote biochar education, identify funding sources, facilitate collaborations between state and local governments and the biochar industry, and develop additional biochar production facilities throughout the state.

With this in mind, a biochar field day was held on Monday, Sept. 22 near Seward, Nebraska.

The event was hosted by the Nebraska Forest Service and Blue Heron Tiospaye, a Lincoln-based nonprofit dedicated to preserving the spiritual, ceremonial and ecological teachings of Indigenous peoples. The field day was organized in collaboration with the UNL Department of Agronomy and Horticulture, the Institute of Agriculture and Natural Resources, the Nebraska Center for Energy Sciences Research and the Nebraska Biochar Initiative.

The field day took place on Blue Heron Tiospaye land in Seward County, near 182nd Street and Fletcher Road — an area actively struggling with eastern redcedar encroachment.

The event demonstrated how to produce biochar from removed eastern redcedar. Landowners, farmers and land managers learned how biochar improves soil health and increases water retention. Experts from the Nebraska Biochar Initiative shared their experiences regarding biochar’s ability to reduce odors, filter pollutants, and serve as a versatile tool for environmental management and urban farming.

The Nebraska Forest Service demonstrated how to produce biochar on-site using an Oregon Kiln and provided information about the necessary equipment, with experts overseeing the process, providing guidance and education.

“This field day is another great opportunity to engage with the community about biochar’s benefits and bring stakeholders together,” Kaiser said.

Field day participants learned about biochar and redcedar management from UNL and the Nebraska Forest Service.

The biochar production process, including burning eastern redcedar, was showcased during the September 22 field day.

Nebraska Water Center team present at OLLI symposium on water issues

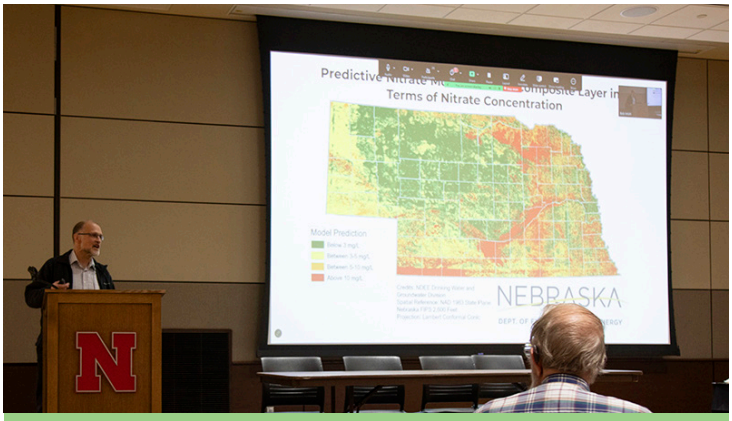
By Ronica Stromberg, School of Natural Resources Program Coordinator

The Osher Lifelong Learning Institute featured a panel of Nebraska Water Center staff and partners as experts at its 2025 fall symposium in the Nebraska East Union on September 27.

With the theme "Global and Regional Water Issues: Challenges and Solutions," the symposium drew 116 attendees to hear from eight speakers about water issues in Nebraska and worldwide.

Daniel Snow, Water Sciences Laboratory director and research professor, and Katie Cameron, hydrogeologist for UNL's School of Natural Resources's Conservation and Survey Division, spoke on a panel about Nebraska water issues with Chittaranjan Ray, director of the Nebraska Water Center; Marty Stange, environmental supervisor for the City of Hastings; and Anthony Schutz, agricultural law professor at the University of Nebraska–Lincoln. Snow directs the Water Sciences Laboratory at the Nebraska Water Center and showcased recent research on water quality issues.

"I think the attendees came away with a greater appreciation of climate and water quality issues the state is facing," he said. "Nebraska is fortunate to have abundant groundwater primarily from the High Plains-Ogallala Aquifer system. Much of this resource lies very close to the surface and is vulnerable to contamination from agricultural activities. Nitrate leached from sandy, heavily irrigated cropland is the most common contaminant, affecting drinking water quality in community and private supplies throughout the state. Extension and outreach efforts, such as the Know Your Well program, help convey this vulnerability to the public and ultimately lead to safer drinking water for all Nebraskans."



Daniel Snow speaks as part of a panel at the OLLI symposium about Nebraska water issues. *Photo Credit: Ethan Freese.*

Bob Michl, director of the Osher Lifelong Learning Institute and symposium organizer, said the event went incredibly well, attracting about 90% of its attendees from the general public. OLLI is a lifelong learning program for adults 50 years and older. It offers noncredit courses and events and the annual symposium. The symposium was offered both in person and virtually and was open to the community.

"There are a lot of people right here at the University of Nebraska who are outstanding resources for us in this particular subject matter," Michl said. "So, we were glad to have them be a part of this."

Podcast episode features Know Your Well program

DAUGHERTY WATER *for* FOOD PODCAST

In the October episode of the Water for Food Podcast, Communications Specialist Arianna Elnes explores a unique initiative that puts water quality testing directly into the hands of high school students across Nebraska. Sara Brock-Contreras, a PhD student advised by Dr. Dan Snow, joins Arianna to discuss her work on the Know Your Well program—an innovative educational and participatory science effort that equips students with the tools, training, and confidence to test domestic wells in their communities.

Through hands-on learning, students gain a deeper understanding of water quality, local geology, and science communication while generating real data about local water quality. Sara shares how this interdisciplinary program is inspiring and engaging the next generation of water leaders. Know Your Well is a signature part of the Nebraska Water Center and more information about the program is available at **knowyourwell.unl.edu**.

The podcast is available at **go.unl.edu/waterforfoodpodcast**.

Know Your Well PhD student advocates for science

By Ronica Stromberg, School of Natural Resources Program Coordinator

Sara Brock-Contreras, a doctoral student at the University of Nebraska–Lincoln, represented Nebraska in Washington, D.C. while advocating for science funding September 9-10, 2025.

Funded by the American Geophysical Union, the two-day trip brought in Brock-Contreras and 32 other earth and space scientists from around the country as experts during the Geosciences Congressional Visits Day. She asked the legislators to support the Safeguard America's Leadership in the Earth and Space Sciences bill, with the highest appropriations for science in the House and Senate fiscal year 2026 appropriations bills. On Sept. 23 she received notification that the bill had passed the House.

She also spoke in meetings about the Weather Act Reauthorization Act that Rep. Mike Flood of Nebraska was cosponsoring. While Brock-Contreras met mostly with legislative aides for approximately 20 minutes, Flood's legislative director, Evan Dean, spent about 30 minutes with her.

"He was already very familiar with the Know Your Well program that I run, and I think that's due to the work that Ann Briggs and Chittaranjan Ray do with the Nebraska Water Center," she said.

The act passed through the House Science, Space, and Technology Committee while Brock-Contreras was in D.C. and will be brought to the House floor for a vote.

Brock-Contreras also spoke with legislators about the Relieving Economic Strain to Enhance American Resilience and Competitiveness in Higher Education and Research Act (RESEARCHER Act), aimed at studying how funding availability affects graduate students and postdoctoral researchers and the resulting STEM workforce.

As the only scientist representing Nebraska, Brock-Contreras had been placed on a team with two scientists from Wyoming. They met face-to-face with Sen. John Barrasso of Wyoming, and she said that was a pleasant surprise. She had been prepared in the Sept. 9 workshops for limited time with policy makers.

"One of the key things that they talked about when doing the science policy messaging--and I had a little bit of this when I volunteered for a science policy action group in my undergrad--but it's 'Focus on the policies. Keep the politics out of the policies. Keep the politics out of the messaging,'" she said.

She focused on showing how interesting her work was, she said, and how policy makers could support that by authorizing programs or appropriating funds. She said the meetings were productive and she learned much from the experience.

"It definitely gave me a lot more respect for and insight on how they draw storylines and make decisions with all of that information coming at them," she said. "Those staffers are just incredibly knowledgeable.

Sara Brock-Contreras, Know Your Well PhD student, advocated for science funding in Washington, D.C. in September.

Sara Brock-Contreras met with Mike Flood and several House and Senate staffers.

And usually, they were very, very interested in hearing about our research and what we want to do. But, how do you take all that and make a decision from it? How do you take all that and then go to a 100-person or 435-person body and get all those people then to agree on a decision?"

From one workshop panelist, she learned logic does not always prevail but that people need to be satisfied with small wins. She said the whole experience will affect the way she communicates with members of Congress and their staff.

"They want to be part of a conversation, but I also need to be prepared with a 25-word, punchy, to-the-point story-ask and thank-you so that I can take 30 seconds of their time and then get out of their way so they can go to their next thing, but also somehow be memorable as I'm the middle of all the meetings they've had that day," she said.

Brock-Contreras's doctoral research looks at how people engage with science and make decisions from that engagement. She said, through policy, she would like to make science accessible to everyone, stating plans to look into the American Geophysical Union's Local Science Partners, a program at the state level, which she expects to be more her speed.

"Those D.C. people have a lot of energy, and I was wiped after I came back," she said. "Again, because the focus was on the policies, and I felt like I could have productive conversations and not have politics, left versus right, hanging over my head, it was really fun to work with people. And that's always just been the dream, is, 'How can I work with as many people as possible to make the world a little bit better place?'"

Nebraska launches Master Irrigator Program to boost farm profitability through water stewardship

By Crystal Powers, Water and Cropping Systems Extension Educator

Nebraska farmers will soon have access to a new incentive-based education program designed to improve irrigation efficiency, profitability, and water stewardship. The Nebraska Master Irrigator initiative aims to reduce groundwater pumping and nitrate leaching through data-driven decision-making while opening doors to bio-economy markets.

The program will cover topics such as precision agriculture, regenerative practices, soil health, water management, and economics. It will bring together farmers, agricultural advisors, and industry professionals. Farmers can engage in peer learning groups, starting in February, to learn from Nebraska On-Farm Research participants, and digital ag technology competitions through programs like TAPS (Testing Ag Performance Solutions).

Currently funded by the University of Nebraska Extension and supported by a five-year technical agreement with NRCS, the program also benefits from industry sponsorships. Nebraska joins a national network of Master Irrigator programs active in ten states, including those across the Ogallala Aquifer region. With partnerships spanning NRDs, USDA NRCS, and over a dozen industry collaborators, the initiative is poised to make a significant impact on sustainable agriculture in the state.

Nebraska Master Irrigator will utilize peer learning groups to boost farm profitability through water stewardship.

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SPRING 2026

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'NEBRASKA WATER DIALOGUES: HOW WATER MANAGEMENT SHAPES OUR COMMUNITIES'

JAN.	FEB.	FEB.	MAR.	MAR.	APR.	APR.
21	4	18	4	25	8	22

SEMINARS ARE AT 3:30 P.M. IN HARDIN HALL 901 ON UNL EAST CAMPUS OR ON ZOOM.

DETAILS ON WATERCENTER.UNL.EDU.

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